

**IN THE UNITED STATES DISTRICT COURT  
FOR THE WESTERN DISTRICT OF TEXAS  
WACO DIVISION**

|                                                                                                                                                      |                                                                                       |
|------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| <b>EVERLIGHT ELECTRONICS CO., LTD,</b><br><br><b>Plaintiff,</b><br><br><b>v.</b><br><br><b>IKEA US RETAIL LLC, et al.,</b><br><br><b>Defendants.</b> | <b>Jury Trial Demanded</b><br><br><b>Civil Action No.</b><br><b>WA-23-CV-00481-AM</b> |
|------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|

**PLAINTIFF EVERLIGHT ELECTRONICS CO., LTD’S  
DISCLOSURE OF ASSERTED CLAIMS  
AND INITIAL INFRINGEMENT CONTENTIONS**

Plaintiff Everlight Electronics Co., Ltd (“Everlight”) hereby serves its Disclosure of Asserted Claim and Initial Infringement Contentions.

Everlight reserves its right to supplement, amend, or revise these initial infringement contentions if new information about IKEA’s products becomes available.

## **I. Disclosure of Asserted Claims and Initial Contentions**

### **(a) Asserted Claims.**

Everlight asserts that Defendant has and/or continues to directly infringe, and/or indirectly infringe by active inducement the following claims:

1. U.S. Pat. No. 9,905,742 B2 (the “’742 Patent”).

Everlight asserts that Defendant infringes claims 1-2, 5-12, 15, and 20-21 of the ’742 Patent (the “’742 Asserted Claims”).

2. U.S. Pat. No. 7,554,126 B2 (the “’126 Patent”).

Everlight asserts that Defendant infringes claims 1, 2, and 4-13 of the ’126 Patent (the “’126 Asserted Claims”).

3. U.S. Pat. No. 9,640,733 (the “’733 Patent”).

Everlight asserts that Defendant infringes claims 1-6 of the ’733 Patent (the “’733 Asserted Claim”).

(b) Initial Infringement Contentions Claim Charts.

1. '742 Patent Initial Infringement Contentions.

Everlight's Initial Infringement Contentions claim charts for the '742 Patent are attached as Exhibit A to these disclosures, which sets forth where in each accused product each element of the '742 Asserted Claims is found.

As shown in Exhibit A, Everlight contends that each element of the '742 Asserted Claims is literally present in each accused product. To the extent that Defendant contends that certain elements are not literally present in the accused products, the elements are at least present under the Doctrine of Equivalents because the difference between the claim element(s) and Defendants infringement, if any, are insubstantial and the accused products perform substantially the same function, in substantially the same way, to achieve substantially the same result.

Everlight specifically reserves the right to amend or supplement its claim charts upon, e.g., obtaining design documentation for the LEDs accused of infringement of the '742 Patent and/or discovering new products that infringe the '742 Patent.

The accused products for the '742 patent are:

IKEA Ledare 5.5W E26

IKEA SOLHETTA LED bulb E12 450 lumen, globe opal

IKEA TRÅDFRI LED bulb E26 806 lumen, smart wireless  
dimmable/warm white globe

IKEA TRÅDFRI LED bulb E12 450 lumen, smart wireless  
dimmable/white spectrum globe

IKEA SOLHETTA LED bulb E12 250 lumen, chandelier/opal

IKEA SOLHETTA LED bulb E12 450 lumen, chandelier/opal

IKEA SOLHETTA LED bulb E12 800 lm, dimmable/globe opal, 2 "

IKEA SOLHETTA LED bulb E26 800 lumen, globe opal, 5000 K

IKEA SOLHETTA LED bulb GU10 600 lumen, dimmable

IKEA SOLHETTA LED bulb E26 1600 lumen, dimmable/globe opal

IKEA SOLHETTA LED bulb PAR38 E26 900 lumen, dimmable, 2700 K

IKEA SOLHETTA LED bulb GU10 380 lumen, 5000 K

IKEA TRÅDFRI LED bulb E26 800 lumen, smart wireless  
dimmable/color and white spectrum globe

IKEA TRÅDFRI LED bulb GU10 380 lumen, smart wireless  
dimmable/white spectrum

IKEA TRÅDFRI LED bulb E12 450 lumen, smart wireless  
dimmable/white spectrum chandelier

IKEA TRÅDFRI LED bulb E26 800 lumen, smart wireless  
dimmable/white spectrum globe

IKEA TRÅDFRI LED bulb E26 450 lumen, smart wireless

dimnable/white spectrum tube-shaped

IKEA TRÅDFRI LED bulb PAR38 E26 900 lumen, smart wireless

dimnable/white spectrum

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## 2. '126 Patent Initial Infringement Contentions.

Everlight's Initial Infringement Contentions claim charts for the '126 Patent are attached as Exhibit B to these disclosures, which sets forth where in each accused product each element of the '126 Asserted Claims is found.

As shown in Exhibit B, Everlight contends that each element of the '126 Asserted Claims is literally present in each accused product. To the extent that Defendant contends that certain elements are not literally present in the accused products, the elements are at least present under the Doctrine of Equivalents because the difference between the claim element(s) and Defendants infringement, if any, are insubstantial and the accused product(s) performs substantially the same function, in substantially the same way, to achieve substantially the same result.

Everlight specifically reserves the right to amend or supplement its claim charts upon, e.g., obtaining design documentation for the LEDs accused of infringement of the '126 Patent.

The accused products for the '126 patent are:

IKEA ROLLSBO LED bulb E26 140 lumen

IKEA TRADFRI LED bulb E26 250 lumen, smart wireless  
dimmable/warm white globe

IKEA MOLNART LED bulb E26 260 lumen, ellipse shaped multicolor,  
6"

IKEA MOLNART LED bulb E26 140 lumen, globe gray clear glass, 5"

IKEA TRADFRI LED bulb E12 250 lumen, smart wireless  
dimmable/warm white chandelier

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### 3. '733 Patent Initial Infringement Contentions.

Everlight's Initial Infringement Contentions claim charts for the '733 Patent are attached as Exhibit C to these disclosures, which sets forth where in each accused product each element of the '733 Asserted Claim is found.

As shown in Exhibit C, Everlight contends that each element of the '733 Asserted Claim is literally present in each accused product. To the extent that Defendant contends that certain elements are not literally present in the accused products, the elements are at least present under the Doctrine of Equivalents because the difference between the claim element(s) and Defendants infringement, if any, are insubstantial and the accused products perform substantially the same function, in substantially the same way, to achieve substantially the same result.

Everlight specifically reserves the right to amend or supplement its claim charts upon, e.g., obtaining design documentation for the LEDs accused of infringement of the '733 Patent.

The accused products for the '733 patent are:

IKEA Ledare GX53 LED Bulb

IKEA Ledare 8.9W E26

IKEA Ryet LED bulb G4 100 lumen, opal, 2700 K

IKEA SOLHETTA LED bulb PAR20 E26 500 lumen, dimmable, 2700 K

IKEA SOLHETTA LED bulb GU10 380 lumen, dimmable

IKEA SOLHETTA LED bulb E26 1100 lumen, dimmable/globe opal, 4 "

IKEA SOLHETTA LED bulb E26 800 lumen, dimmable/globe opal

IKEA TRÅDFRI LED bulb GU10 400 lumen, smart wireless

dimmable/warm white

IKEA TRÅDFRI LED bulb E26 800 lumen, smart wireless

dimmable/color and white spectrum globe

(c) Priority Date.

For purposes of this litigation, the priority date for the '742 Asserted Claims is no later than May 23, 2014.

For purposes of this litigation, the priority date for the '126 Asserted Claims is no later than September 27, 2004.

For purposes of this litigation, the priority date for '733 Asserted Claims is no later than May 23, 2014.

Copies of (1) documents relating to the conception and reduction to practice for each claimed invention, found after a diligent search reasonable under the circumstances, and (2) the file history for each patent in suit are being produced contemporaneously herewith.

This 22nd day of March, 2023.

Respectfully submitted,

LOCKE LORD LLP

By: /s/ Mark Hannemann

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*Counsel for Plaintiff Everlight  
Electronics Co. Ltd.*

**CERTIFICATE OF SERVICE**

I certify that on March 22, 2024, I am causing this document to be served by email and/or electronic file transfer on all counsel of record.

/s/ Mark Hannemann

Mark Hannemann

# EXHIBIT B

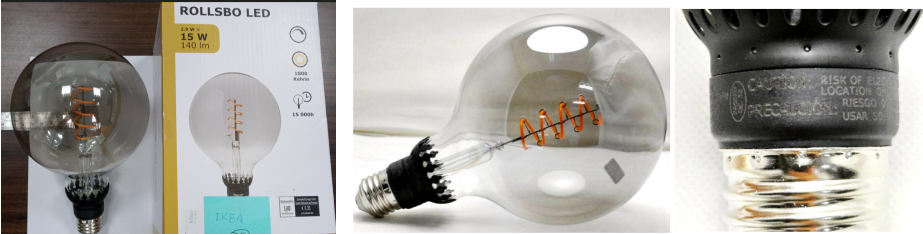
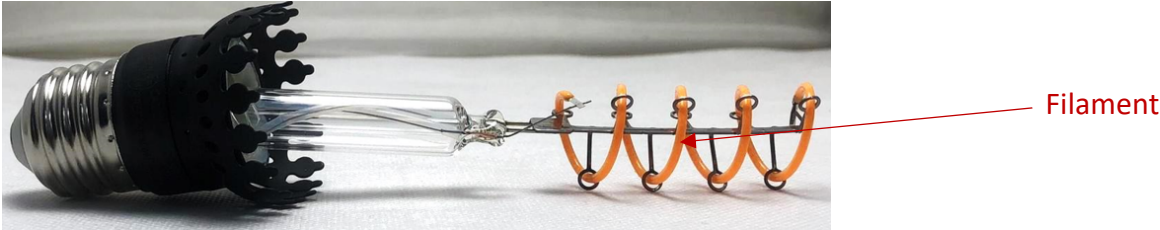
### **Infringement of U.S. Patent No. 7,554,126 by the IKEA Accused Filament Products**

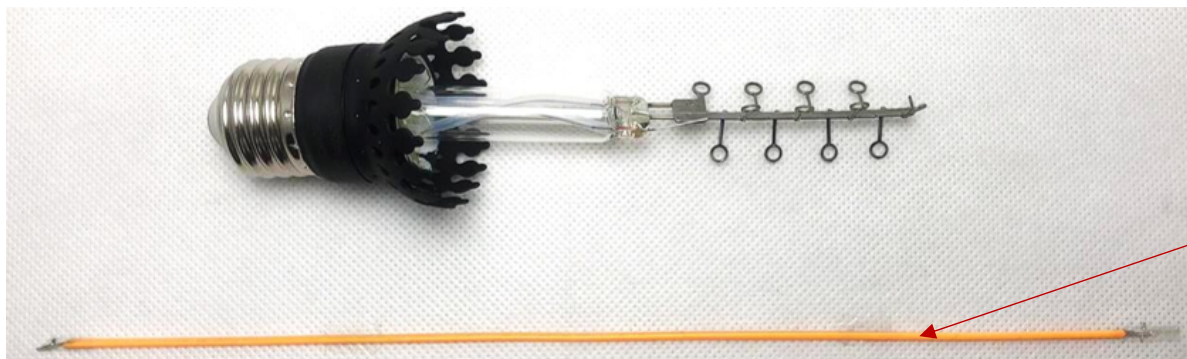
Everlight Electronics Co., Ltd. (“Everlight”) is accusing the following products manufactured, used, sold, and/or offered for sale in the United States, or imported into the United States, in the time period ranging from six years prior to the filing of Everlight’s complaint to present having at least one filament LED with at least one LED Flip Chip (the “Filament Accused Products”) of infringing claims 1-2 and 4-13 (the “Asserted Filament Claims”) of U.S. Patent No. 7,554,126 (the “’126 patent”).

| <b>IKEA Filament Accused Products</b>                                              |
|------------------------------------------------------------------------------------|
| IKEA ROLLSBO LED bulb E26 140 lumen                                                |
| IKEA TRADFRI LED bulb E26 250 lumen, smart wireless dimmable/warm white globe      |
| IKEA MOLNART LED bulb E26 260 lumen, ellipse shaped multicolor, 6"                 |
| IKEA MOLNART LED bulb E26 140 lumen, globe gray clear glass, 5"                    |
| IKEA TRADFRI LED bulb E12 250 lumen, smart wireless dimmable/warm white chandelier |

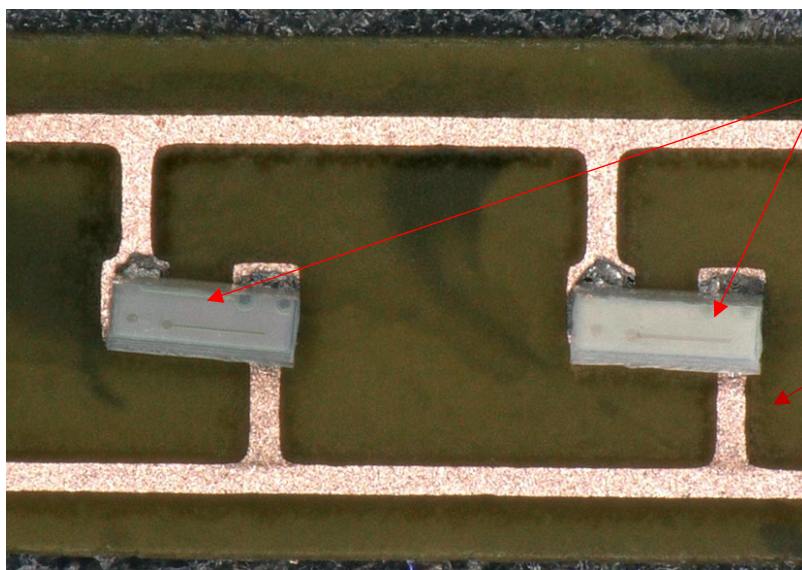
The preliminary infringement contentions set forth below are representative of, and apply to, all Filament Accused Products. The only differences Everlight has observed based on its investigation to date between the specific models of the Filament Accused Products, including between the representative example and the represented products, are not material to infringement of the Asserted Filament Claims, including for example, the number of LED chips, circuit board shape, emission wavelength of the LED chip and LED size. The analysis set forth in the following claim charts applies to all of Filament Accused Products, including those with the same LED Flip Chip as the representative example.

Infringement Claim Chart for US Patent 7,554,126

| '126 Claims Element |                                                    | Elements in Accused Filament Product                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|---------------------|----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Claim 1             |                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 1.0                 | A semiconductor light-emitting element comprising: | <p>The Accused Filament Product are light-emitting devices.</p> <p>The LED Flip Chips mounted on the circuit board in the Accused Filament Product are semiconductor light-emitting elements. See, for example:</p> <p><b><u>ROLLSBO LED BULB E26 140 LUMEN:</u></b></p> <div></div> <p>The filament within in the Accused Filament Product includes the circuit boards and the LED Flip Chips that are surrounding by yellow sealing members.</p> <div></div> |



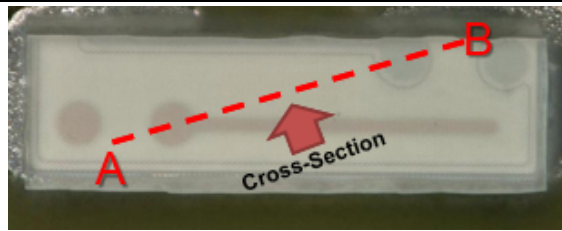
The LED Flip Chips are mounted on the circuit board. The LED Flip Chips in the Accused Filament Product are semiconductor light-emitting elements.



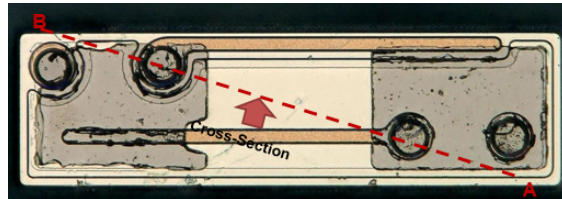
1.1 a light-transmitting element substrate;

The LED Flip Chip in the Accused Filament Product includes a light-transmitting element substrate (e.g., a Sapphire/ $\text{Al}_2\text{O}_3$  substrate).

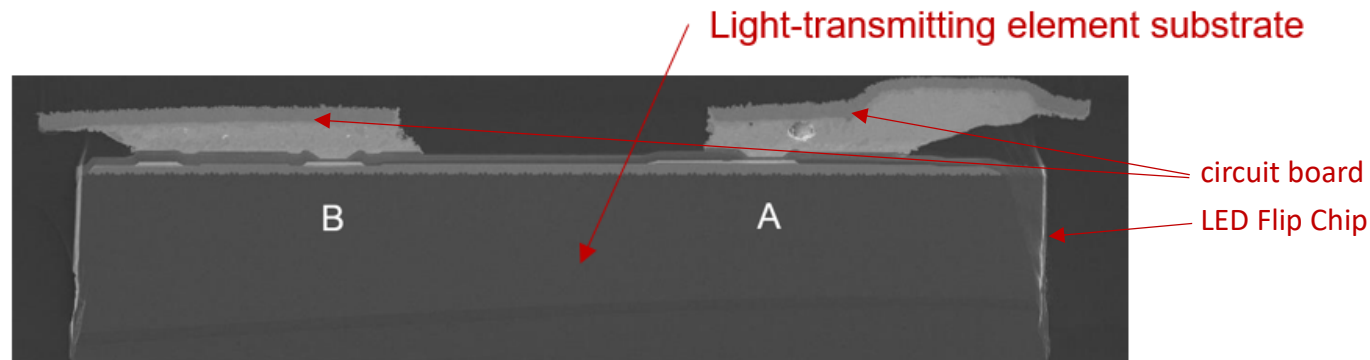
See, e.g., cross-sectional image of **ROLLSBO LED BULB E26 140 LUMEN**:



(Top view of the LED Flip chip)

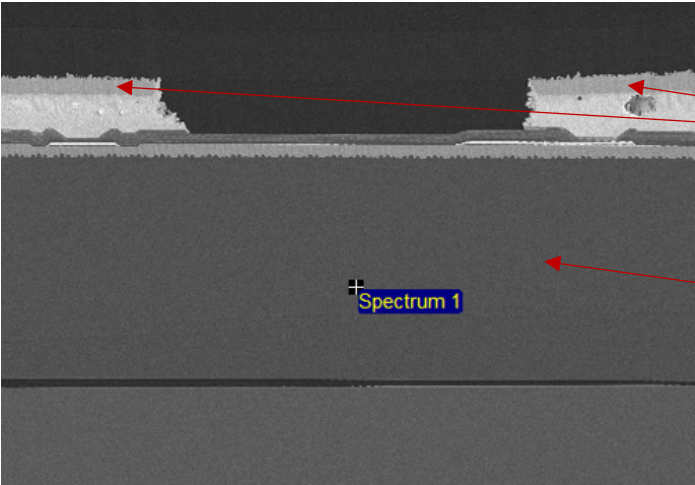
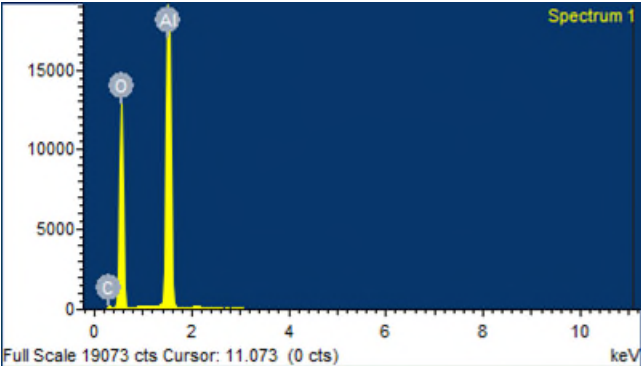


(Bottom view of the LED Flip chip)

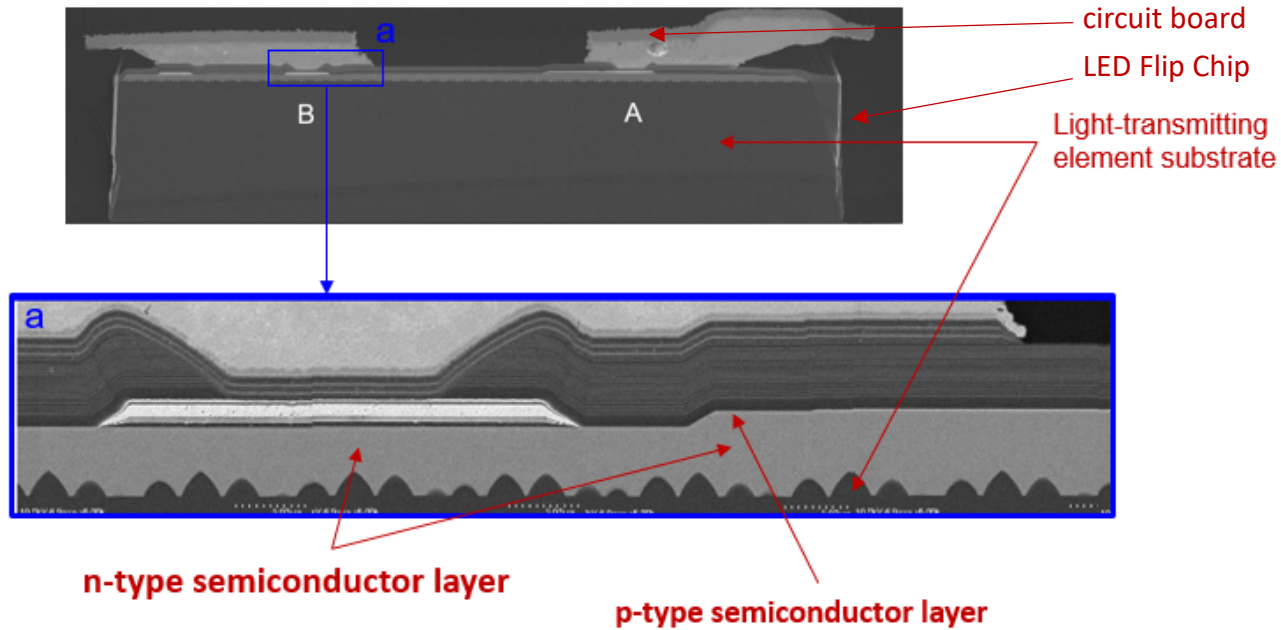


See, e.g., SEM-EDX Analysis of **the light-transmitting element substrate of ROLLSBO LED BULB E26 140 LUMEN:**

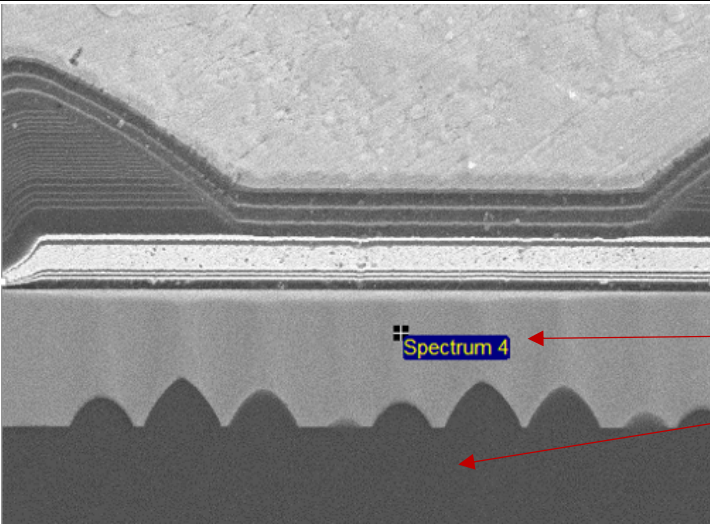
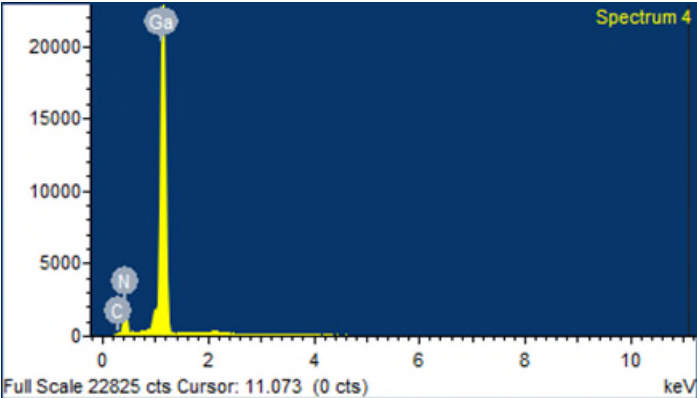
The light-transmitting element substrate in the LED Flip Chip is sapphire that allows the light to be extracted. Spectrum 1 (below panel) shows the elemental constituents of the light-transmitting element substrate (below panel) as obtained from SEM-EDX analysis. As shown in Spectrum 1 (below panel), the elements Aluminum (Al) and Oxygen (O) are present in the light-transmitting element substrate (below panel), which is consistent with the light-transmitting element substrate comprising sapphire ( $\text{Al}_2\text{O}_3$ ).

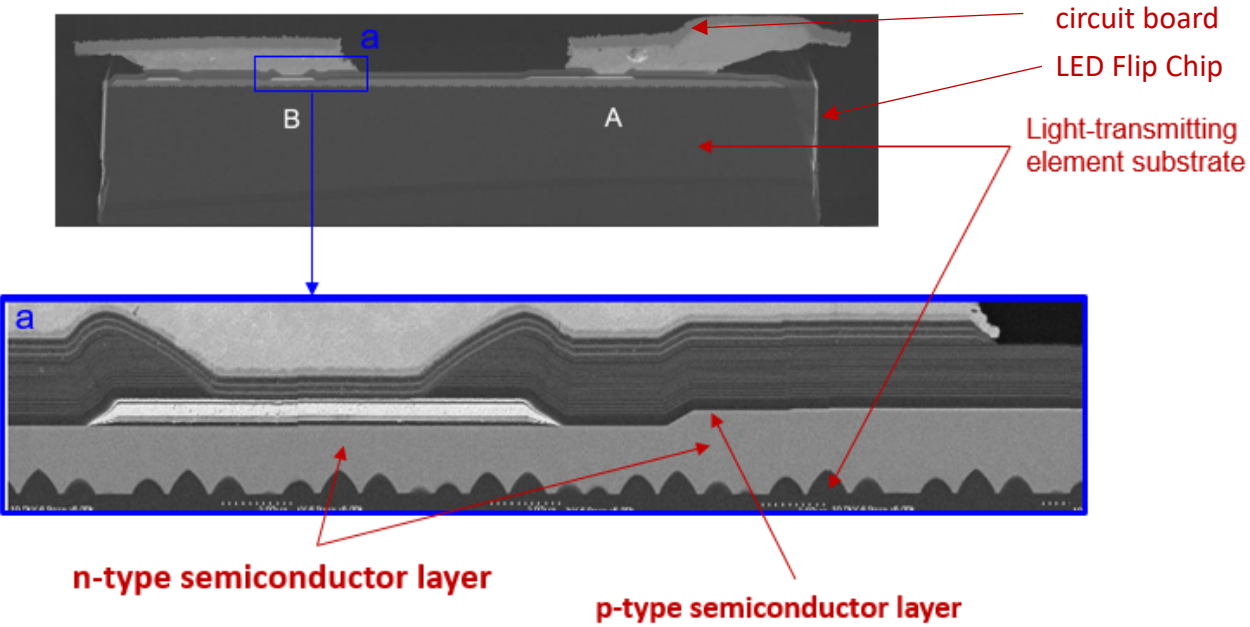
|         |                                                                                                     | <div><p>circuit board</p><p>LED Flip Chip</p><p>light-transmitting element substrate</p></div> <div><table><thead><tr><th>Element</th><th>Weight%</th><th>Atomic%</th></tr></thead><tbody><tr><td>C K</td><td>2.94</td><td>4.77</td></tr><tr><td>O K</td><td>50.73</td><td>61.78</td></tr><tr><td>Al K</td><td>46.33</td><td>33.46</td></tr><tr><td>Totals</td><td>100.00</td><td></td></tr></tbody></table></div>                                                                                                                                                                                                                                                          | Element | Weight% | Atomic% | C K | 2.94 | 4.77 | O K | 50.73 | 61.78 | Al K | 46.33 | 33.46 | Totals | 100.00 |  |
|---------|-----------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|---------|---------|-----|------|------|-----|-------|-------|------|-------|-------|--------|--------|--|
| Element | Weight%                                                                                             | Atomic%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |         |         |         |     |      |      |     |       |       |      |       |       |        |        |  |
| C K     | 2.94                                                                                                | 4.77                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |         |         |         |     |      |      |     |       |       |      |       |       |        |        |  |
| O K     | 50.73                                                                                               | 61.78                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |         |         |         |     |      |      |     |       |       |      |       |       |        |        |  |
| Al K    | 46.33                                                                                               | 33.46                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |         |         |         |     |      |      |     |       |       |      |       |       |        |        |  |
| Totals  | 100.00                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |         |         |         |     |      |      |     |       |       |      |       |       |        |        |  |
| 1.2     | an n-type semiconductor layer formed on the element substrate so as to cover the element substrate; | <p>The LED Flip chip in the Accused Filament Product includes an n-type semiconductor layer (e.g., GaN), and the n-type semiconductor layer form on and cover the element substrate.</p> <p>See, e.g., enlarged image of rectangular area in the cross-sectional image of <b><u>ROLLSBO LED BULB E26 140 LUMEN</u></b>:</p> <p>The gallium nitride (GaN) layer of the LED Flip Chip is n-type semiconductor layer formed on the element substrate so as to cover the element substrate. Spectrum 4 (below panel) shows the elemental constituents of a layer of the LED (below panel) as obtained from SEM-EDX analysis. As shown in Spectrum 4 (below panel), the elements Gallium (Ga) and Nitrogen (N) are present in the n-type semiconductor layer (below panel), which is consistent with the LED Flip Chip comprising Gallium Nitride</p> |         |         |         |     |      |      |     |       |       |      |       |       |        |        |  |

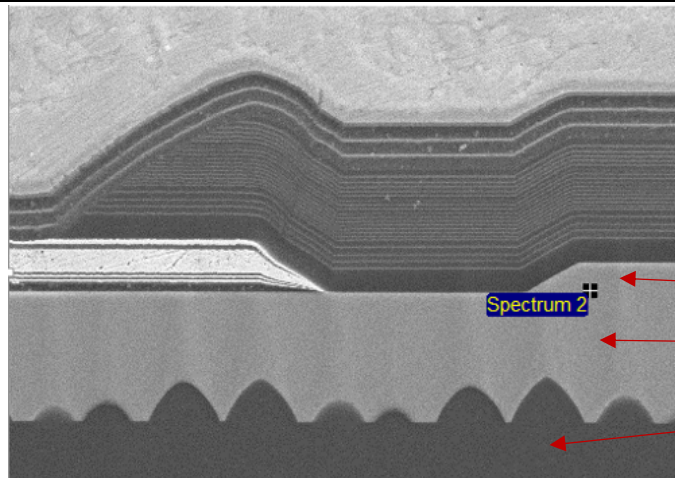
(GaN).



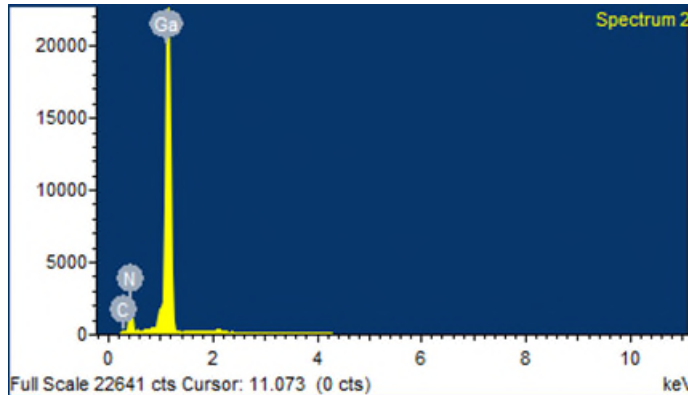
See, e.g., EDX Analysis of the n-type semiconductor layer of ROLLSBO LED BULB E26 140 LUMEN:

|         |                                                                          | <div><p>n-type semiconductor layer</p><p>light-transmitting element substrate</p><div><table><thead><tr><th>Element</th><th>Weight%</th><th>Atomic%</th></tr></thead><tbody><tr><td>C K</td><td>2.83</td><td>8.68</td></tr><tr><td>N K</td><td>19.05</td><td>50.07</td></tr><tr><td>Ga L</td><td>78.12</td><td>41.25</td></tr><tr><td>Totals</td><td>100.00</td><td></td></tr></tbody></table></div></div>               | Element | Weight% | Atomic% | C K | 2.83 | 8.68 | N K | 19.05 | 50.07 | Ga L | 78.12 | 41.25 | Totals | 100.00 |  |
|---------|--------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|---------|---------|-----|------|------|-----|-------|-------|------|-------|-------|--------|--------|--|
| Element | Weight%                                                                  | Atomic%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |         |         |         |     |      |      |     |       |       |      |       |       |        |        |  |
| C K     | 2.83                                                                     | 8.68                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |         |         |         |     |      |      |     |       |       |      |       |       |        |        |  |
| N K     | 19.05                                                                    | 50.07                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |         |         |         |     |      |      |     |       |       |      |       |       |        |        |  |
| Ga L    | 78.12                                                                    | 41.25                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |         |         |         |     |      |      |     |       |       |      |       |       |        |        |  |
| Totals  | 100.00                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |         |         |         |     |      |      |     |       |       |      |       |       |        |        |  |
| 1.3     | a p-type semiconductor layer formed so as to cover an area on the n-type | <p>The LED Flip chip in the Accused Filament Product includes a p-type semiconductor layer (e.g., GaN), and the p-type semiconductor layer form on and cover the n-type semiconductor layer for emitting light, but an area for an n-electrode on the n-type semiconductor layer isn't covered by p-type semiconductor layer.</p> <p>See, e.g., enlarged image of rectangular area in the cross-sectional image of <b>ROLLSBO LED BULB E26 140 LUMEN</b>:</p> <p>The gallium nitride (GaN) layer of the LED Flip Chip is p-type semiconductor layer so as to cover an area on the n-type</p> |         |         |         |     |      |      |     |       |       |      |       |       |        |        |  |

|                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>semiconductor layer from which an area for an n-electrode on the n-type semiconductor layer is excluded, for emitting light in cooperation with the n-type semiconductor layer;</p> | <p>semiconductor layer from which an area for an n-electrode on the n-type semiconductor layer is excluded, for emitting light in cooperation with the n-type semiconductor layer. Spectrum 2 (below panel) shows the elemental constituents of a layer of the LED (below panel) as obtained from SEM-EDX analysis. As shown in Spectrum 2 (below panel), the elements Gallium (Ga) and Nitrogen (N) are present in the p-type semiconductor layer (below panel), which is consistent with the LED Flip Chip comprising Gallium Nitride (GaN).</p> <div data-bbox="501 357 1747 986"><p>The image consists of two SEM-EDX analysis panels. The top panel shows a cross-section of the LED flip chip assembly, with labels 'A' and 'B' indicating specific areas. The bottom panel is a magnified view of the semiconductor layers, showing the n-type semiconductor layer and the p-type semiconductor layer. Red arrows point from the labels 'circuit board', 'LED Flip Chip', 'Light-transmitting element substrate', 'n-type semiconductor layer', and 'p-type semiconductor layer' to their respective components in the image.</p></div> <p>See, e.g., EDX Analysis of <u>the p-type semiconductor layer of ROLLSBO LED BULB E26 140 LUMEN:</u></p> |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|



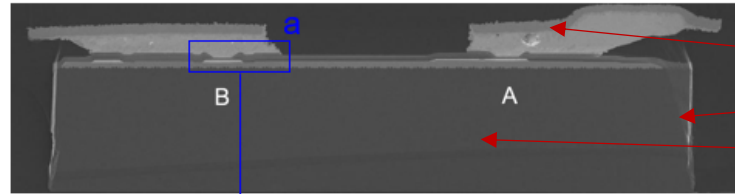
p-type semiconductor layer  
n-type semiconductor layer  
light-transmitting element substarte



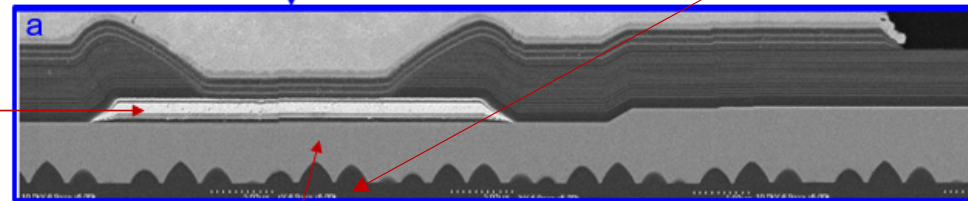
| Element | Weight% | Atomic% |
|---------|---------|---------|
| C K     | 3.03    | 9.26    |
| N K     | 18.94   | 49.65   |
| Ga L    | 78.03   | 41.09   |
| Totals  | 100.00  |         |

1.4 a first n-electrode that is a **thin** film formed on the area for the n-electrode of the n-type semiconductor layer;

The LED Flip chip in the Accused Filament Product includes a first n-electrode (e.g., Au) that is a thin film formed on the area for the n-electrode of the n-type semiconductor layer.  
See, e.g., enlarged image of rectangular area in the cross-sectional image of **ROLLSBO LED BULB E26 140 LUMEN**:



circuit board  
LED Flip Chip  
light-transmitting element substrate

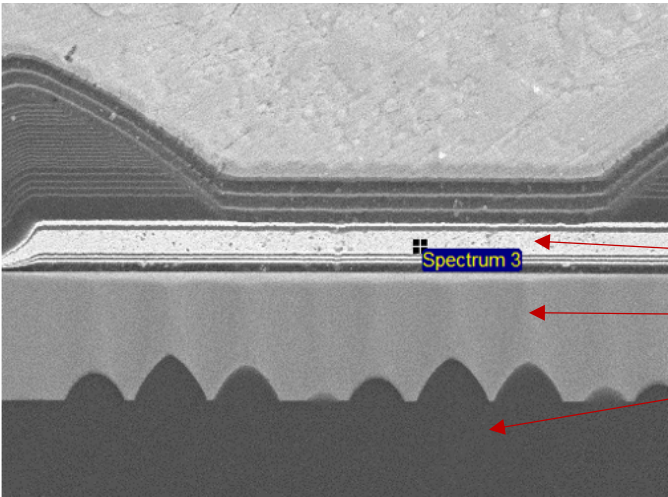
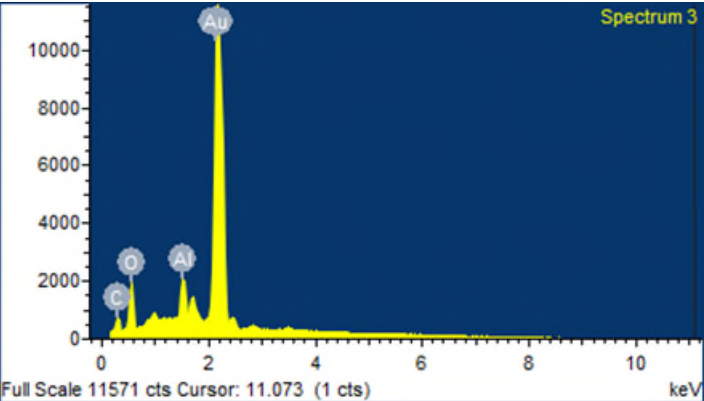


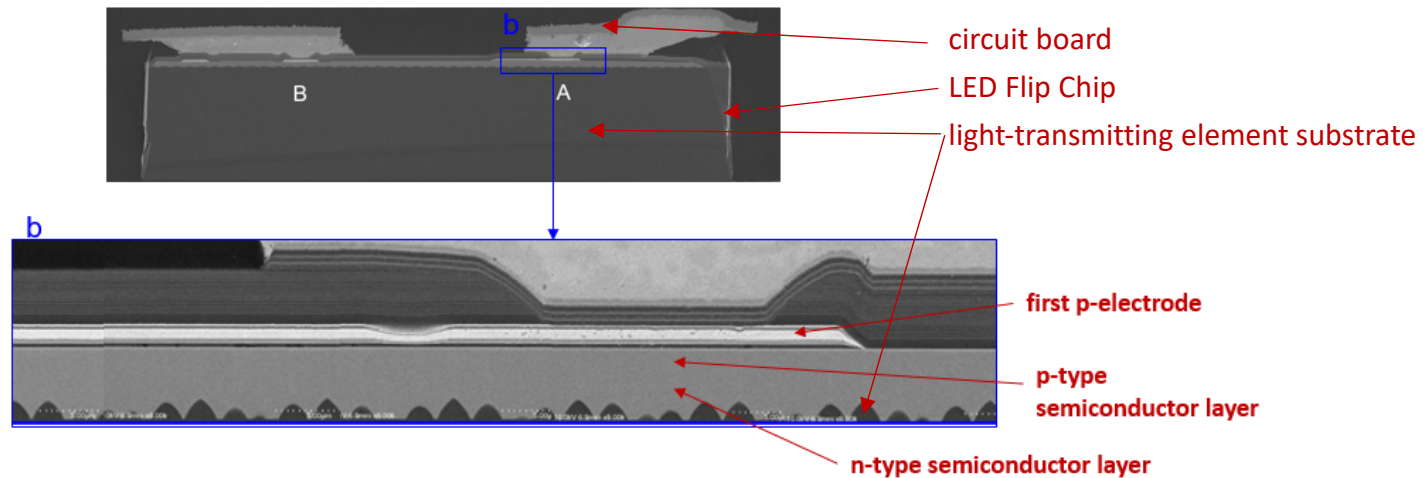
first n-electrode

n-type semiconductor layer

See, e.g., EDX Analysis of **the first n-electrode of ROLLSBO LED BULB E26 140 LUMEN**:

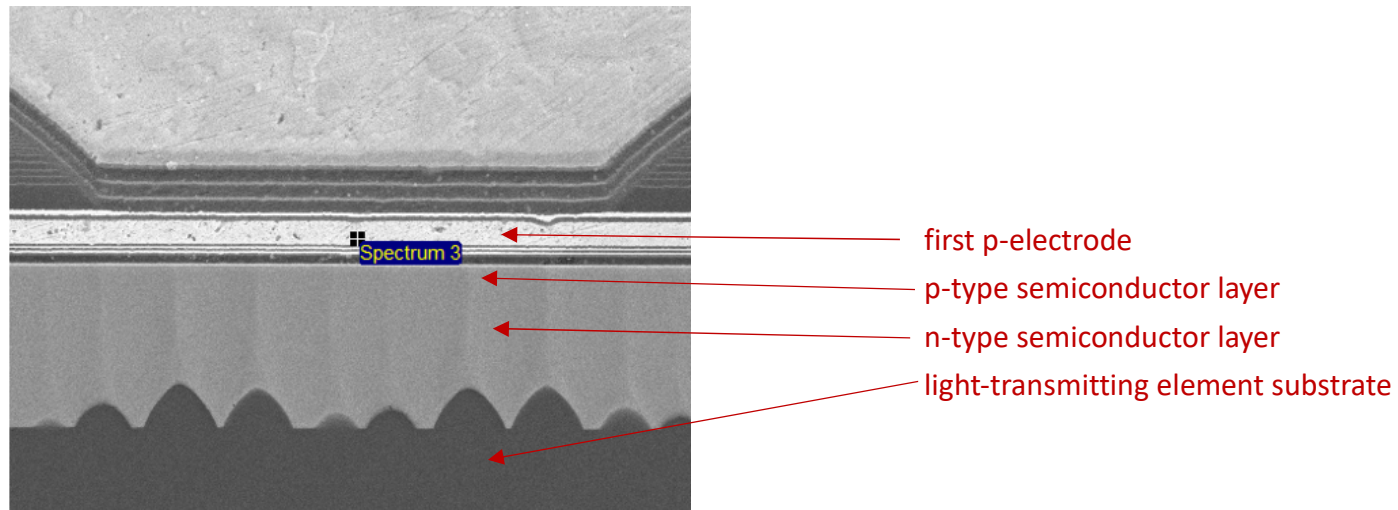
Spectrum 3 (below panel) shows the n-type electrode (below panel) as obtained from SEM-EDX analysis. As shown in Spectrum 3 (below panel), the elements Gold (Au) and Aluminum (Al) are present in the first n-electrode (below panel).

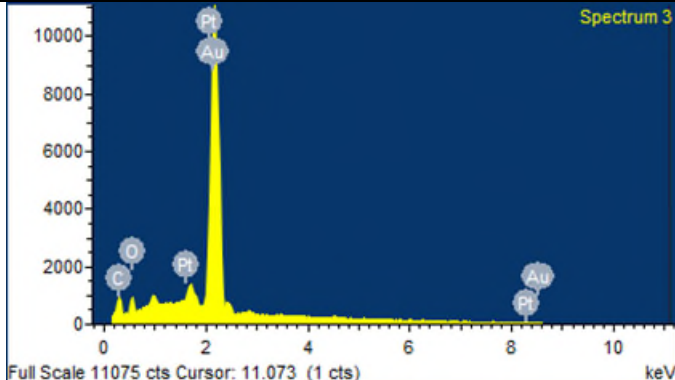
|         |                                                                                   |   <table border="1"> <thead> <tr> <th>Element</th><th>Weight%</th><th>Atomic%</th></tr> </thead> <tbody> <tr> <td>C K</td><td>3.63</td><td>23.11</td></tr> <tr> <td>O K</td><td>7.80</td><td>37.26</td></tr> <tr> <td>Al K</td><td>2.15</td><td>6.08</td></tr> <tr> <td>Au M</td><td>86.43</td><td>33.55</td></tr> <tr> <td>Totals</td><td>100.00</td><td></td></tr> </tbody> </table> | Element | Weight% | Atomic% | C K | 3.63 | 23.11 | O K | 7.80 | 37.26 | Al K | 2.15 | 6.08 | Au M | 86.43 | 33.55 | Totals | 100.00 |  |
|---------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|---------|---------|-----|------|-------|-----|------|-------|------|------|------|------|-------|-------|--------|--------|--|
| Element | Weight%                                                                           | Atomic%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |         |         |         |     |      |       |     |      |       |      |      |      |      |       |       |        |        |  |
| C K     | 3.63                                                                              | 23.11                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |         |         |         |     |      |       |     |      |       |      |      |      |      |       |       |        |        |  |
| O K     | 7.80                                                                              | 37.26                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |         |         |         |     |      |       |     |      |       |      |      |      |      |       |       |        |        |  |
| Al K    | 2.15                                                                              | 6.08                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |         |         |         |     |      |       |     |      |       |      |      |      |      |       |       |        |        |  |
| Au M    | 86.43                                                                             | 33.55                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |         |         |         |     |      |       |     |      |       |      |      |      |      |       |       |        |        |  |
| Totals  | 100.00                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |         |         |         |     |      |       |     |      |       |      |      |      |      |       |       |        |        |  |
| 1.5     | a first p-electrode that is a thin film formed on the p-type semiconductor layer; | <p>The LED Flip chip in the Accused Filament Product includes a first p-electrode (e.g., Au and Pt) that is a thin film formed on the p-type semiconductor layer.</p> <p>See, e.g., enlarged image of rectangular area in the cross-sectional image of <b><u>ROLLSBO LED BULB E26 140 LUMEN</u></b>:</p>                                                                                                                                                                                                                                                    |         |         |         |     |      |       |     |      |       |      |      |      |      |       |       |        |        |  |

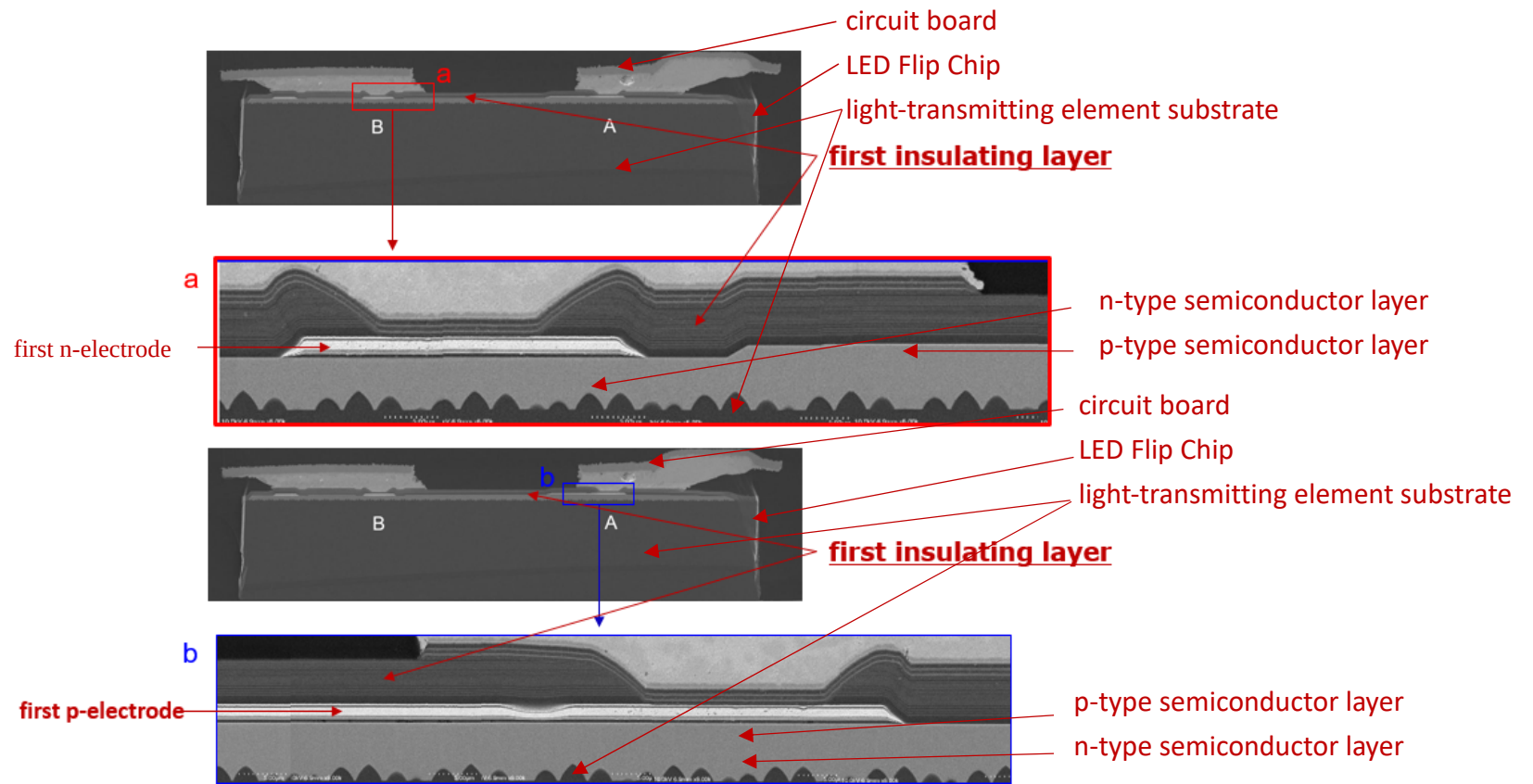


See, e.g., EDX Analysis of **the first p-electrode of ROLLSBO LED BULB E26 140 LUMEN:**

Spectrum 3 (below panel) shows the n-type electrode (below panel) as obtained from SEM-EDX analysis. As shown in Spectrum 3 (below panel), the elements Gold (Au) and Platinum (Pt) are present in the first p-electrode (below panel).

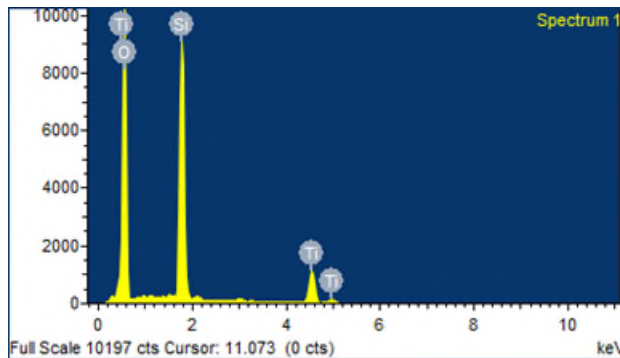
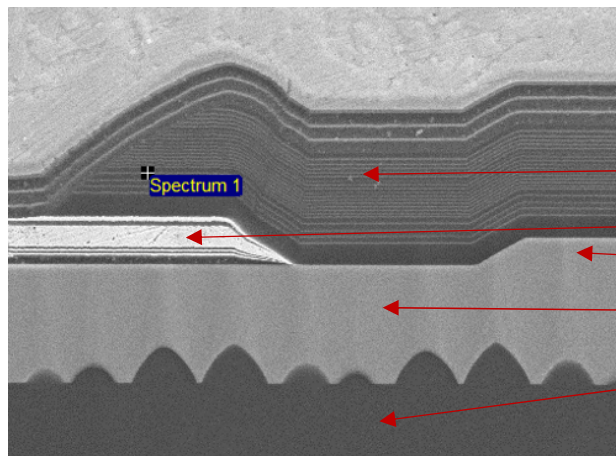


|         |                                                                                                                            |  <table border="1"> <thead> <tr> <th>Element</th><th>Weight%</th><th>Atomic%</th></tr> </thead> <tbody> <tr> <td>C K</td><td>4.60</td><td>36.89</td></tr> <tr> <td>O K</td><td>2.96</td><td>17.82</td></tr> <tr> <td>Pt M</td><td>20.83</td><td>10.28</td></tr> <tr> <td>Au M</td><td>71.61</td><td>35.02</td></tr> <tr> <td>Totals</td><td>100.00</td><td></td></tr> </tbody> </table> | Element | Weight% | Atomic% | C K | 4.60 | 36.89 | O K | 2.96 | 17.82 | Pt M | 20.83 | 10.28 | Au M | 71.61 | 35.02 | Totals | 100.00 |  |
|---------|----------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|---------|---------|-----|------|-------|-----|------|-------|------|-------|-------|------|-------|-------|--------|--------|--|
| Element | Weight%                                                                                                                    | Atomic%                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |         |         |         |     |      |       |     |      |       |      |       |       |      |       |       |        |        |  |
| C K     | 4.60                                                                                                                       | 36.89                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |         |         |         |     |      |       |     |      |       |      |       |       |      |       |       |        |        |  |
| O K     | 2.96                                                                                                                       | 17.82                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |         |         |         |     |      |       |     |      |       |      |       |       |      |       |       |        |        |  |
| Pt M    | 20.83                                                                                                                      | 10.28                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |         |         |         |     |      |       |     |      |       |      |       |       |      |       |       |        |        |  |
| Au M    | 71.61                                                                                                                      | 35.02                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |         |         |         |     |      |       |     |      |       |      |       |       |      |       |       |        |        |  |
| Totals  | 100.00                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |         |         |         |     |      |       |     |      |       |      |       |       |      |       |       |        |        |  |
| 1.6     | a first insulating layer that is formed so as to insulate the first n-electrode and the first p-electrode from each other; | <p>The LED Flip chip in the Accused Filament Product includes a first insulating layer (e.g., SiO<sub>x</sub> and TiO<sub>x</sub>) that is formed on the first n-electrode and the first p-electrode and insulate them from each other.</p> <p>See, e.g., enlarged images of rectangular areas in the cross-sectional image of <b><u>ROLLSBO LED BULB E26 140 LUMEN</u></b>:</p>                                                                                         |         |         |         |     |      |       |     |      |       |      |       |       |      |       |       |        |        |  |

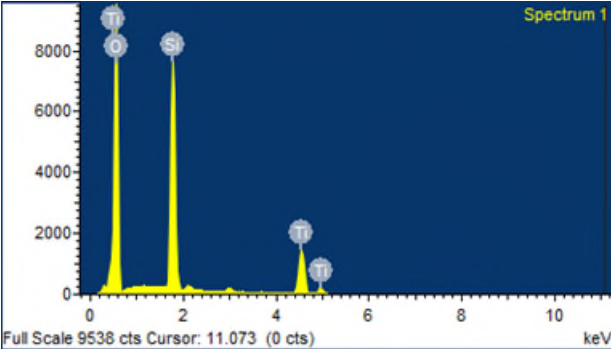
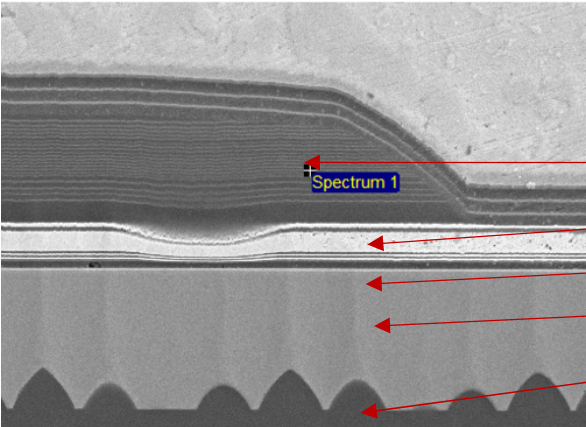


See, e.g., EDX Analysis of **the first insulating layer of ROLLSBO LED BULB E26 140 LUMEN:**

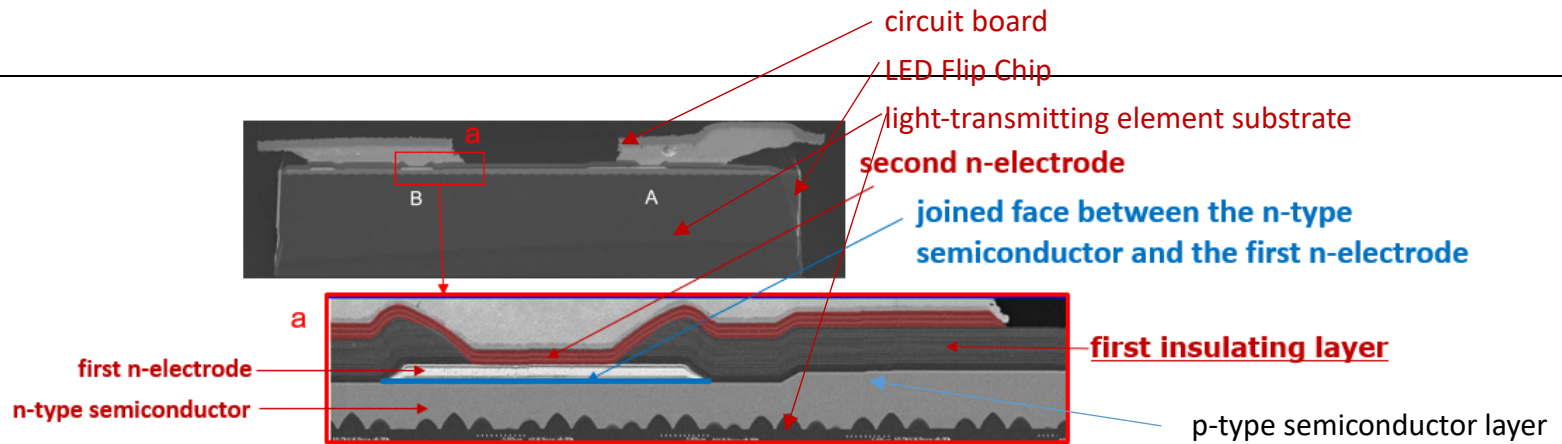
Spectrum 1 (below panel) shows the first insulating layer (below panel) as obtained from SEM-EDX analysis. As shown in Spectrum 1 (below panel), the elements Silicon (Si), Titanium (Ti) and Oxygen are present in the first insulating layer (below panel), which is consistent with the LED Flip Chip comprising Silicon Oxide (SiO<sub>x</sub>) and Titanium Oxide(TiO<sub>x</sub>).



| Element | Weight% | Atomic% |
|---------|---------|---------|
| O K     | 55.10   | 72.41   |
| Si K    | 25.45   | 19.05   |
| Ti K    | 19.45   | 8.53    |
| Totals  | 100.00  |         |

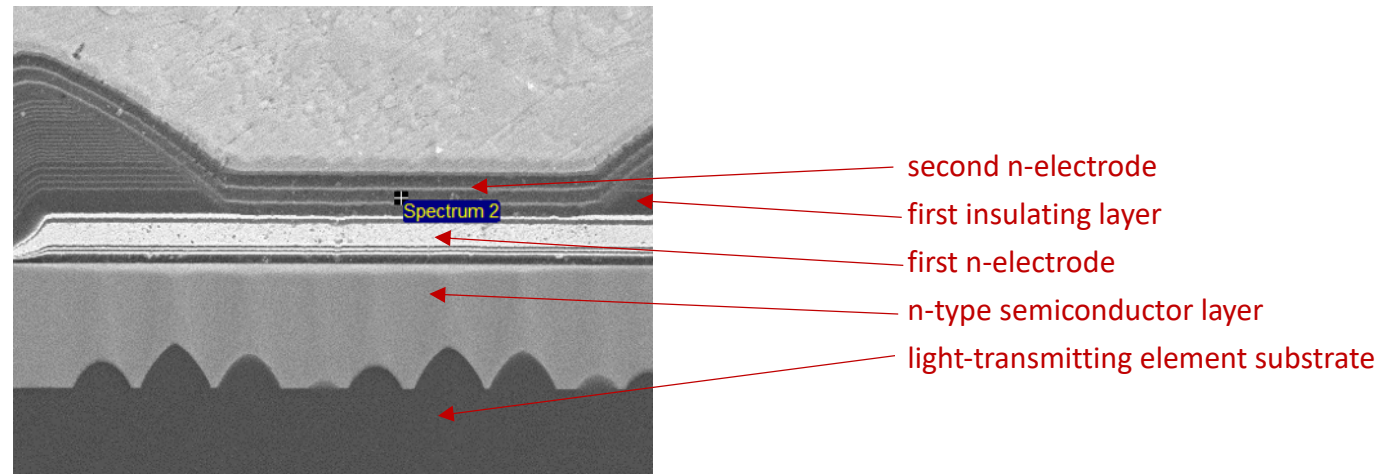
|         |                                                                                                                                                                                  | <div><table border="1" data-bbox="1111 600 1628 900"><thead><tr><th>Element</th><th>Weight%</th><th>Atomic%</th></tr></thead><tbody><tr><td>O K</td><td>54.48</td><td>73.02</td></tr><tr><td>Si K</td><td>20.88</td><td>15.95</td></tr><tr><td>Ti K</td><td>24.64</td><td>11.03</td></tr><tr><td>Totals</td><td>100.00</td><td></td></tr></tbody></table></div> | Element | Weight% | Atomic% | O K | 54.48 | 73.02 | Si K | 20.88 | 15.95 | Ti K | 24.64 | 11.03 | Totals | 100.00 |  |
|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|---------|---------|-----|-------|-------|------|-------|-------|------|-------|-------|--------|--------|--|
| Element | Weight%                                                                                                                                                                          | Atomic%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |         |         |         |     |       |       |      |       |       |      |       |       |        |        |  |
| O K     | 54.48                                                                                                                                                                            | 73.02                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |         |         |         |     |       |       |      |       |       |      |       |       |        |        |  |
| Si K    | 20.88                                                                                                                                                                            | 15.95                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |         |         |         |     |       |       |      |       |       |      |       |       |        |        |  |
| Ti K    | 24.64                                                                                                                                                                            | 11.03                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |         |         |         |     |       |       |      |       |       |      |       |       |        |        |  |
| Totals  | 100.00                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |         |         |         |     |       |       |      |       |       |      |       |       |        |        |  |
| 1.7     | a second n-electrode formed on the first n-electrode and the first insulating layer as a thin film having an area larger than a joined face between the n-type semiconductor and | <p>The LED Flip chip in the Accused Filament Product includes a second n-electrode (e.g., Al) formed on the first n-electrode and the first insulating layer as a thin film.</p> <p>In addition, the second n-electrode is electrically connected to the first n-electrode and being insulated from the first p-electrode by the first insulating layer.</p> <p>See, e.g., enlarged images of rectangular areas in the cross-sectional image of <b><u>ROLLSBO LED BULB E26 140 LUMEN</u></b>:</p>                                   |         |         |         |     |       |       |      |       |       |      |       |       |        |        |  |

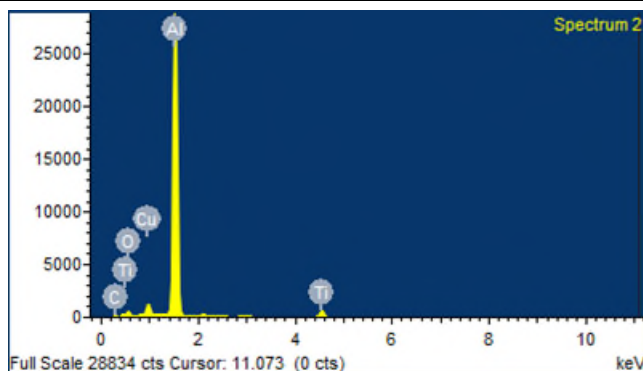
the first n-electrode so that the second n-electrode is electrically connected to the first n-electrode, the second n-electrode being insulated from the first p-electrode by the first insulating layer; and



See, e.g., EDX Analysis of **the second n-electrode of ROLLSBO LED BULB E26 140 LUMEN**:

Spectrum 2 (below panel) shows the second n-electrode (below panel) as obtained from SEM-EDX analysis. As shown in Spectrum 2 (below panel), the elements Aluminum (Al) and Titanium (Ti) are present in the second n-electrode (below panel).



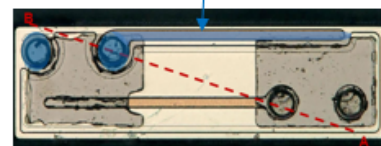
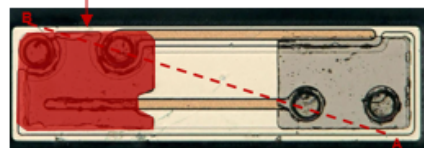


| Element | Weight% | Atomic% |
|---------|---------|---------|
| C K     | 4.30    | 9.80    |
| O K     | 3.44    | 5.88    |
| Al K    | 73.26   | 74.29   |
| Ti K    | 13.08   | 7.47    |
| Cu L    | 5.92    | 2.55    |
| Totals  | 100.00  |         |

As shown below, the area of the second n-electrode is the **red area**, and the area of the joined face between the n-type semiconductor and the first n-electrode is the same as the area of the first n-electrode, which is the **blue area**; therefore, the area of the second n-electrode (**red area**) is larger than the area of the joined face between the n-type semiconductor and the first n-electrode (**blue area**).

**an area of the second n-electrode** >

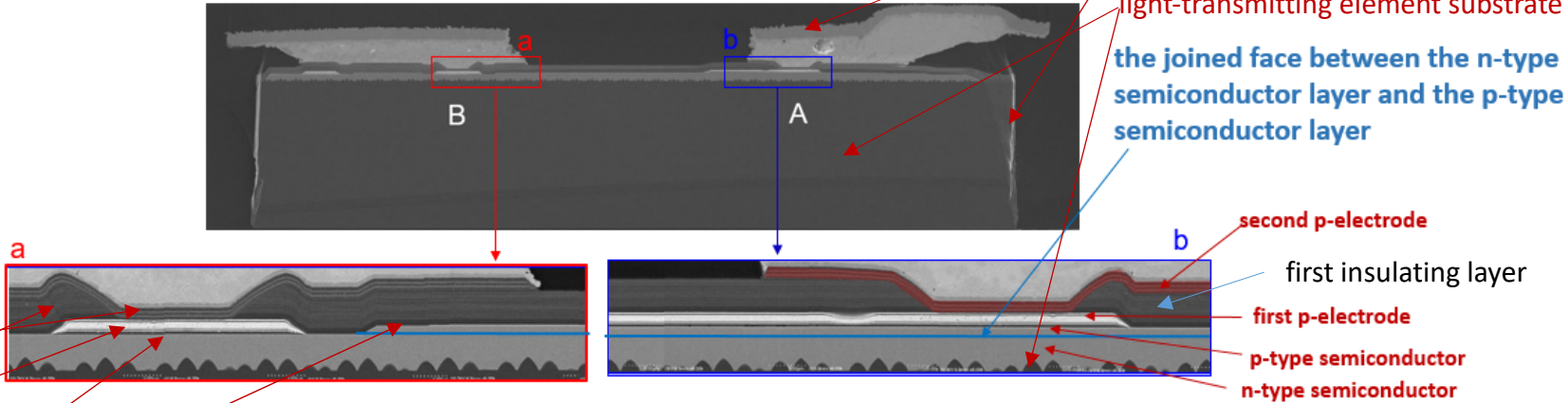
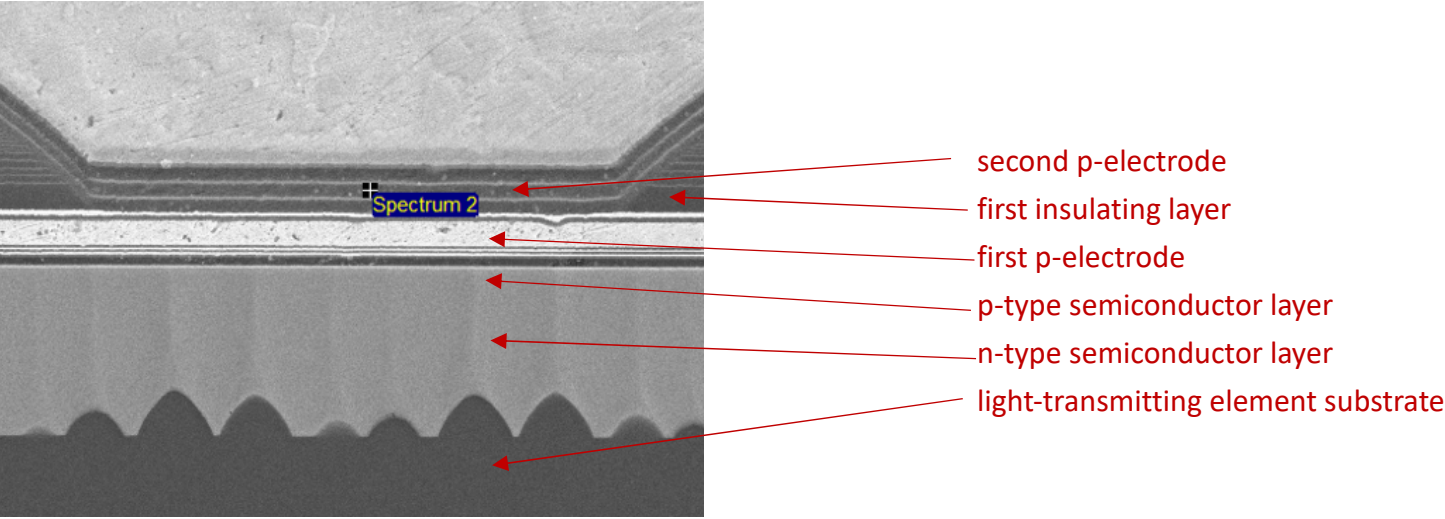
**an area of the joined face between the n-type semiconductor and the first n-electrode**

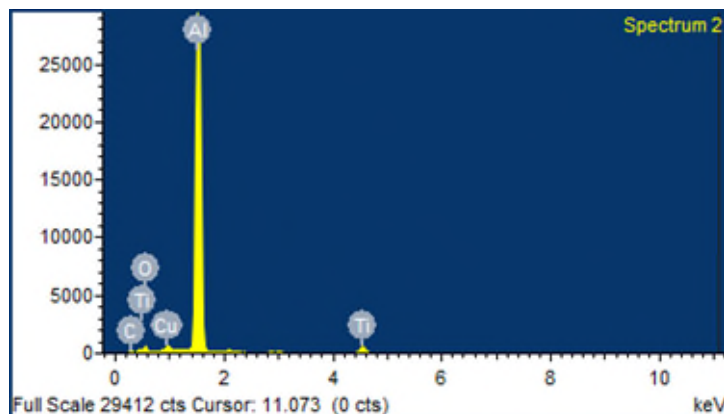


1.8 a second p-electrode formed as a thin film having an area smaller than a joined face between the n-type semiconductor

The LED Flip chip in the Accused Filament Product includes a second p-electrode (e.g., Al) formed as a thin film, and the second p-electrode being electrically connected to the first p-electrode.

See, e.g., enlarged images of rectangular areas in the cross-sectional image of **ROLLSBO LED BULB E26 140 LUMEN:**

|                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|--------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>layer and the p-type semiconductor layer, the second p-electrode being electrically connected to the first p-electrode.</p> |  <p>See, e.g., EDX Analysis of <b><u>the second p-electrode of ROLLSBO LED BULB E26 140 LUMEN:</u></b></p> <p>Spectrum 2 (below panel) shows the second p-electrode (below panel) as obtained from SEM-EDX analysis. As shown in Spectrum 2 (below panel), the elements Aluminum (Al) and Titanium (Ti) are present in the second p-electrode (below panel).</p> |
|                                                                                                                                |  <p>second p-electrode</p> <p>first insulating layer</p> <p>first p-electrode</p> <p>p-type semiconductor layer</p> <p>n-type semiconductor layer</p> <p>light-transmitting element substrate</p>                                                                                                                                                               |



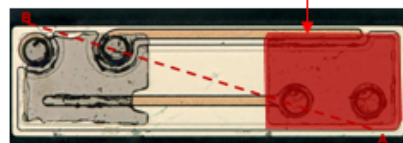
| Element | Weight% | Atomic% |
|---------|---------|---------|
| C K     | 4.37    | 9.74    |
| O K     | 3.17    | 5.30    |
| Al K    | 77.63   | 77.01   |
| Ti K    | 12.33   | 6.89    |
| Cu L    | 2.50    | 1.05    |
| Totals  | 100.00  |         |

As shown below, the area of the second p-electrode is the **red area**, and the area of joined face between the n-type semiconductor layer and the p-type semiconductor layer is approximately the area outside of the first n-electrode, which is the **blue area**; therefore, the area of the second p-electrode (**red area**) is smaller than the area of the joined face between the n-type semiconductor layer and the p-type semiconductor layer (**blue area**).

**an area of the second p-electrode**

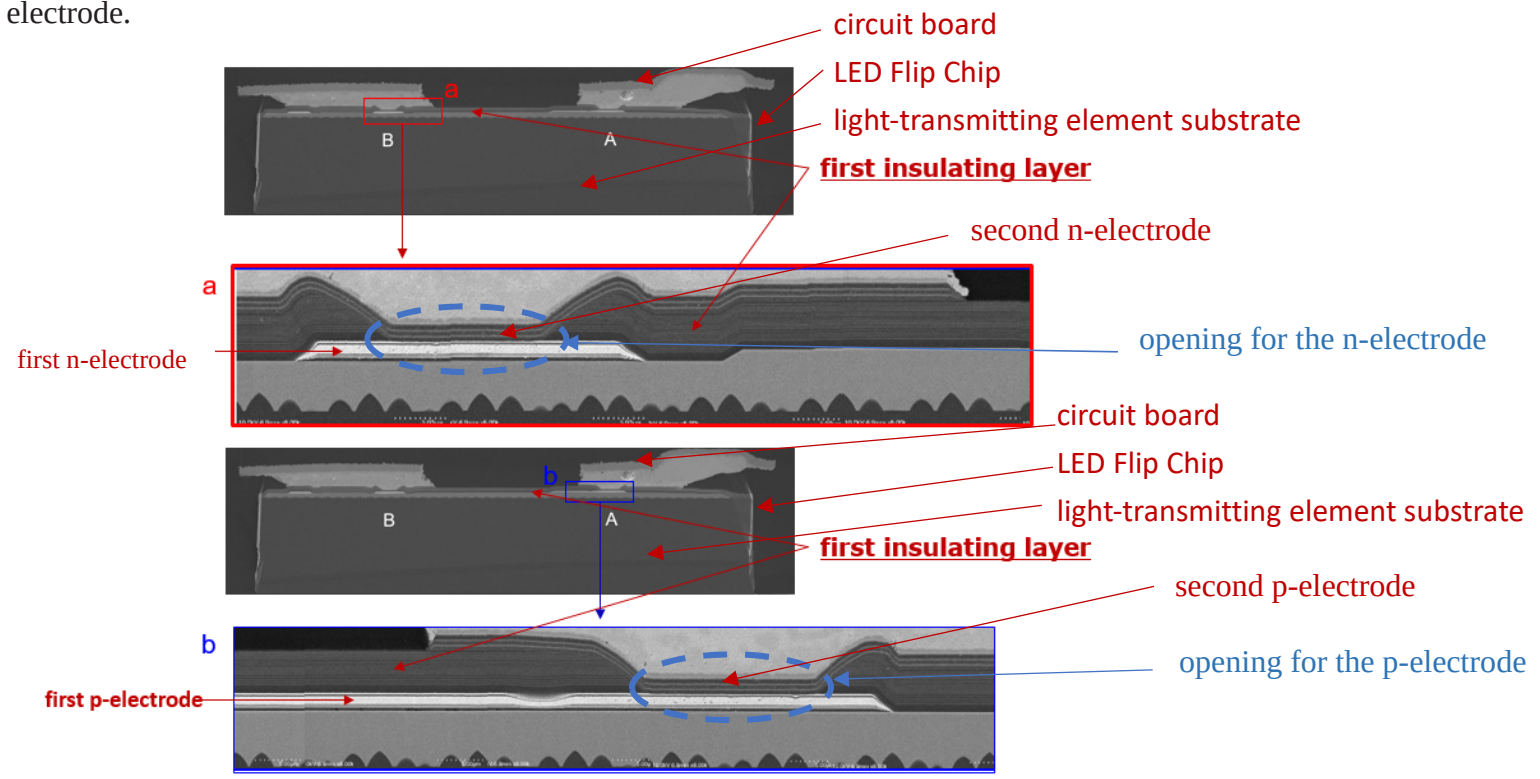


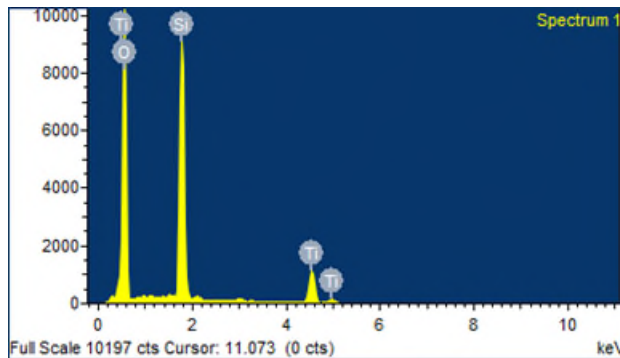
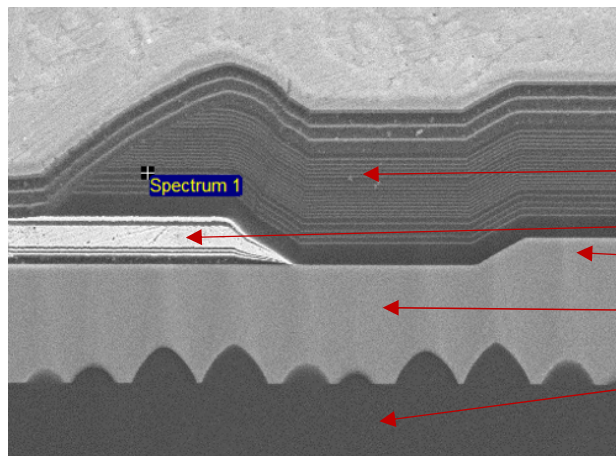
**an area of the joined face between the n-type semiconductor layer and the p-type semiconductor layer**



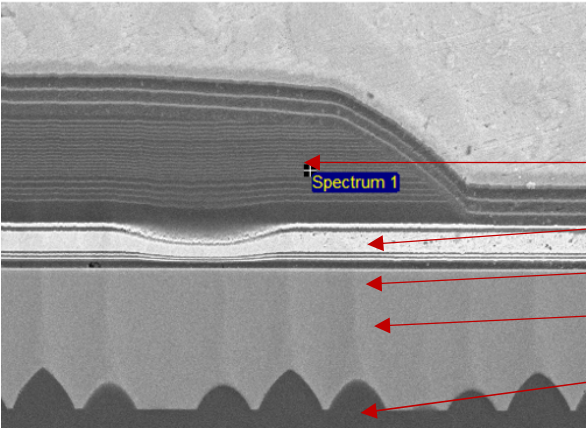
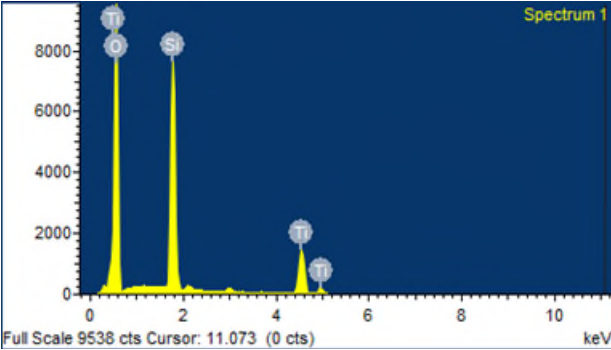
| '126 Claims Element |                                                                                                                                                                                                                                                                                                                                                                             | Elements in Accused Filament Product |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Claim 2             |                                                                                                                                                                                                                                                                                                                                                                             |                                      |
| 2.0<br>to<br>2.5    | <p>A semiconductor light-emitting element comprising:</p> <p>a light-transmitting element substrate;</p> <p>an n-type semiconductor layer formed on the element substrate so as to cover the element substrate;</p> <p>a p-type semiconductor layer formed so as to cover an area on the n-type semiconductor layer from which an area for an n-electrode on the n-type</p> | See claim element 1.0 to 1.5 above.  |

|     |                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|     | <p>semiconductor layer is excluded, for emitting light in cooperation with the n-type semiconductor layer;</p> <p>a first n-electrode that is a thin film formed on the area for the n-electrode of the n-type semiconductor layer;</p> <p>a first p-electrode that is a thin film formed on the p-type semiconductor layer;</p> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 2.6 | <p>a first insulating layer having at least one opening for the n-electrode and one opening for the p-electrode formed therein, which covers the first n-</p>                                                                                                                                                                    | <p>The LED Flip chip in the Accused Filament Product includes a first insulating layer (e.g., SiO<sub>x</sub> and TiO<sub>x</sub>) having at least one opening for the n-electrode and one opening for the p-electrode. In addition, the first insulating layer is formed on the first n-electrode and the first p-electrode and covers them.</p> <p>See, e.g., enlarged images of rectangular areas in the cross-sectional image of <b><u>ROLLSBO LED BULB E26 140 LUMEN</u></b>:</p> <p>The first insulating layer insulate the first n-electrode and the first p-electrode from each other, except for the opening for the n-electrode and the opening for the p-electrode; as shown in the figure below, the first insulating layer don't completely cover the first n-electrode and first p-electrode, and at least one opening for the first n-electrode and at least one opening for the first p-electrode are reserved, so that the first n-electrode can be electrically connected to second n-electrode through the opening for the</p> |

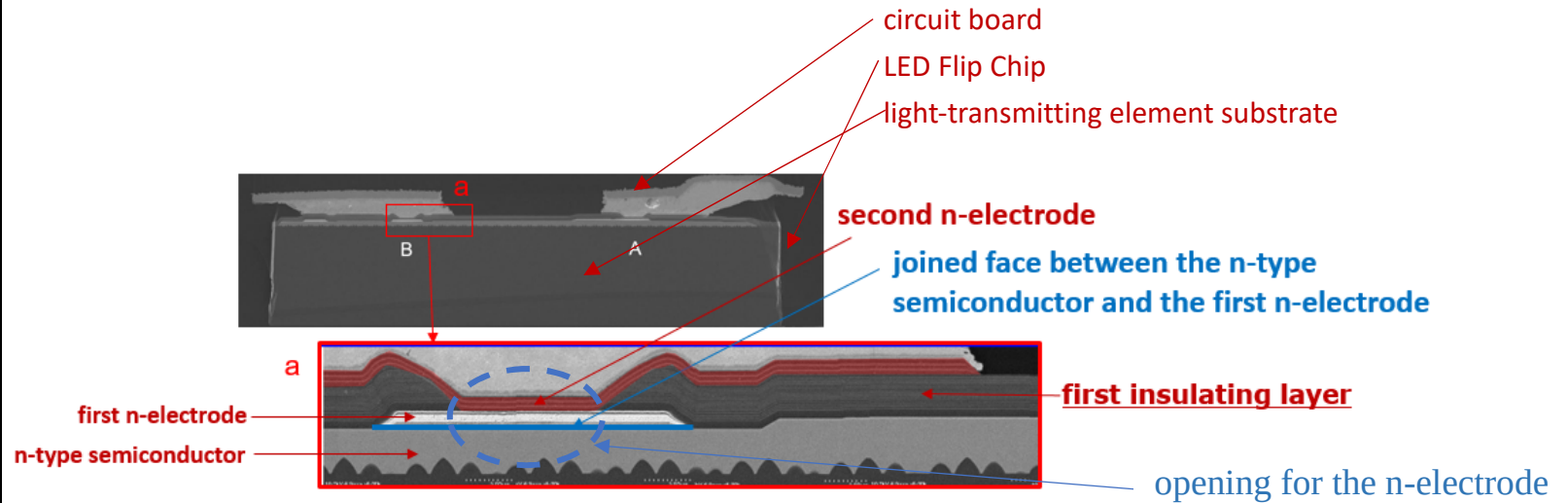
|                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>electrode and the first p-electrode so as to insulate the first n-electrode and the first p-electrode from each other, except for the opening for the n-electrode and the opening for the p-electrode,</p> | <p>p-electrode, and the first p-electrode can also be electrically connected to second p-electrode through the opening for the p-electrode.</p>  <p>See, e.g., EDX Analysis of <b><u>the first insulating layer of ROLLSBO LED BULB E26 140 LUMEN</u></b>:<br/> Spectrum 1 (below panel) shows the first insulating layer (below panel) as obtained from SEM-EDX analysis. As shown in Spectrum 1 (below panel), the elements Silicon (Si), Titanium (Ti) and Oxygen are present in the first insulating layer (below panel), which is consistent with the LED Flip Chip comprising Silicon Oxide (SiO<sub>x</sub>) and Titanium Oxide(TiO<sub>x</sub>).</p> |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|



| Element | Weight% | Atomic% |
|---------|---------|---------|
| O K     | 55.10   | 72.41   |
| Si K    | 25.45   | 19.05   |
| Ti K    | 19.45   | 8.53    |
| Totals  | 100.00  |         |

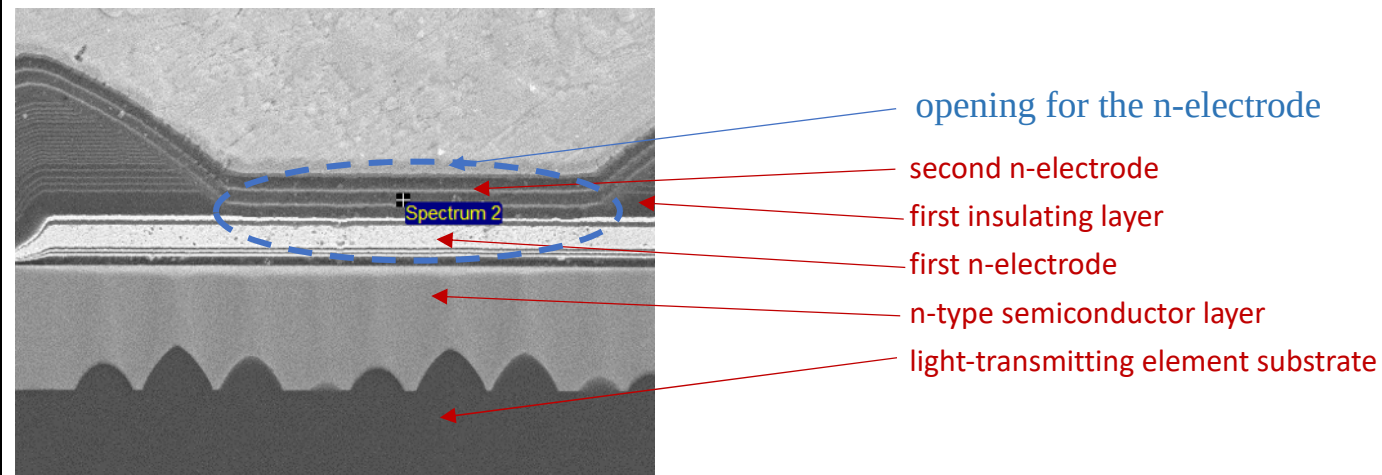
|         |                                                                                                                                                                           | <div><div><p>first insulating layer</p><p>first p-electrode</p><p>p-type semiconductor layer</p><p>n-type semiconductor layer</p><p>light-transmitting element substrate</p></div></div> <div><table><thead><tr><th>Element</th><th>Weight%</th><th>Atomic%</th></tr></thead><tbody><tr><td>O K</td><td>54.48</td><td>73.02</td></tr><tr><td>Si K</td><td>20.88</td><td>15.95</td></tr><tr><td>Ti K</td><td>24.64</td><td>11.03</td></tr><tr><td>Totals</td><td>100.00</td><td></td></tr></tbody></table></div> | Element | Weight% | Atomic% | O K | 54.48 | 73.02 | Si K | 20.88 | 15.95 | Ti K | 24.64 | 11.03 | Totals | 100.00 |  |
|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|---------|---------|-----|-------|-------|------|-------|-------|------|-------|-------|--------|--------|--|
| Element | Weight%                                                                                                                                                                   | Atomic%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |         |         |         |     |       |       |      |       |       |      |       |       |        |        |  |
| O K     | 54.48                                                                                                                                                                     | 73.02                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |         |         |         |     |       |       |      |       |       |      |       |       |        |        |  |
| Si K    | 20.88                                                                                                                                                                     | 15.95                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |         |         |         |     |       |       |      |       |       |      |       |       |        |        |  |
| Ti K    | 24.64                                                                                                                                                                     | 11.03                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |         |         |         |     |       |       |      |       |       |      |       |       |        |        |  |
| Totals  | 100.00                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |         |         |         |     |       |       |      |       |       |      |       |       |        |        |  |
| 2.7     | a second n-electrode formed on the first insulating layer as a thin film having an area larger than a joined face between the n-type semiconductor layer and the first n- | <p>The LED Flip chip in the Accused Filament Product includes a second n-electrode (e.g., Al) formed on the first n-electrode and the first insulating layer as a thin film.</p> <p>In addition, the second n-electrode is electrically connected to the first n-electrode through the opening for the n-electrode of the first insulating layer, and being insulated from the first p-electrode by the first insulating layer.</p> <p>See, e.g., enlarged images of rectangular areas in the cross-sectional image of <b><u>ROLLSBO LED BULB E26 140 LUMEN</u></b>:</p>                                                                                                            |         |         |         |     |       |       |      |       |       |      |       |       |        |        |  |

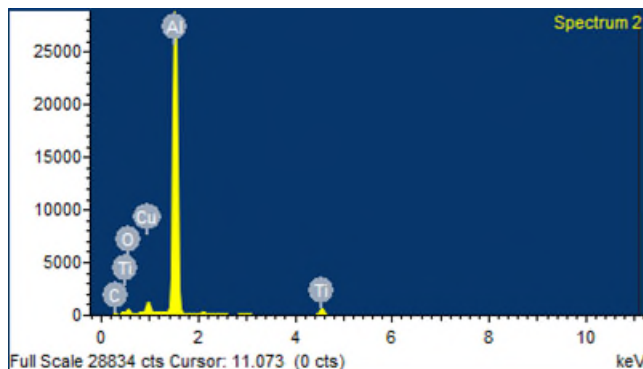
electrode, the second n-electrode being electrically connected to the first n-electrode through the opening for the n-electrode of the first insulating layer; and



See, e.g., EDX Analysis of **the second n-electrode of ROLLSBO LED BULB E26 140 LUMEN:**

Spectrum 2 (below panel) shows the second n-electrode (below panel) as obtained from SEM-EDX analysis. As shown in Spectrum 2 (below panel), the elements Aluminum (Al) and Titanium (Ti) are present in the second n-electrode (below panel).



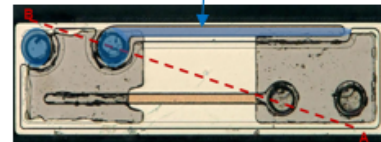
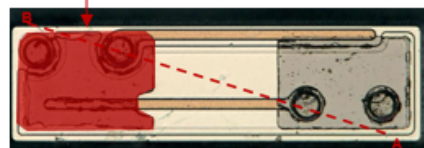


| Element | Weight% | Atomic% |
|---------|---------|---------|
| C K     | 4.30    | 9.80    |
| O K     | 3.44    | 5.88    |
| Al K    | 73.26   | 74.29   |
| Ti K    | 13.08   | 7.47    |
| Cu L    | 5.92    | 2.55    |
| Totals  | 100.00  |         |

As shown below, the area of the second n-electrode is the **red area**, and the area of the joined face between the n-type semiconductor and the first n-electrode is the same as the area of the first n-electrode, which is the **blue area**; therefore, the area of the second n-electrode (**red area**) is larger than the area of the joined face between the n-type semiconductor and the first n-electrode (**blue area**).

**an area of the second n-electrode** >

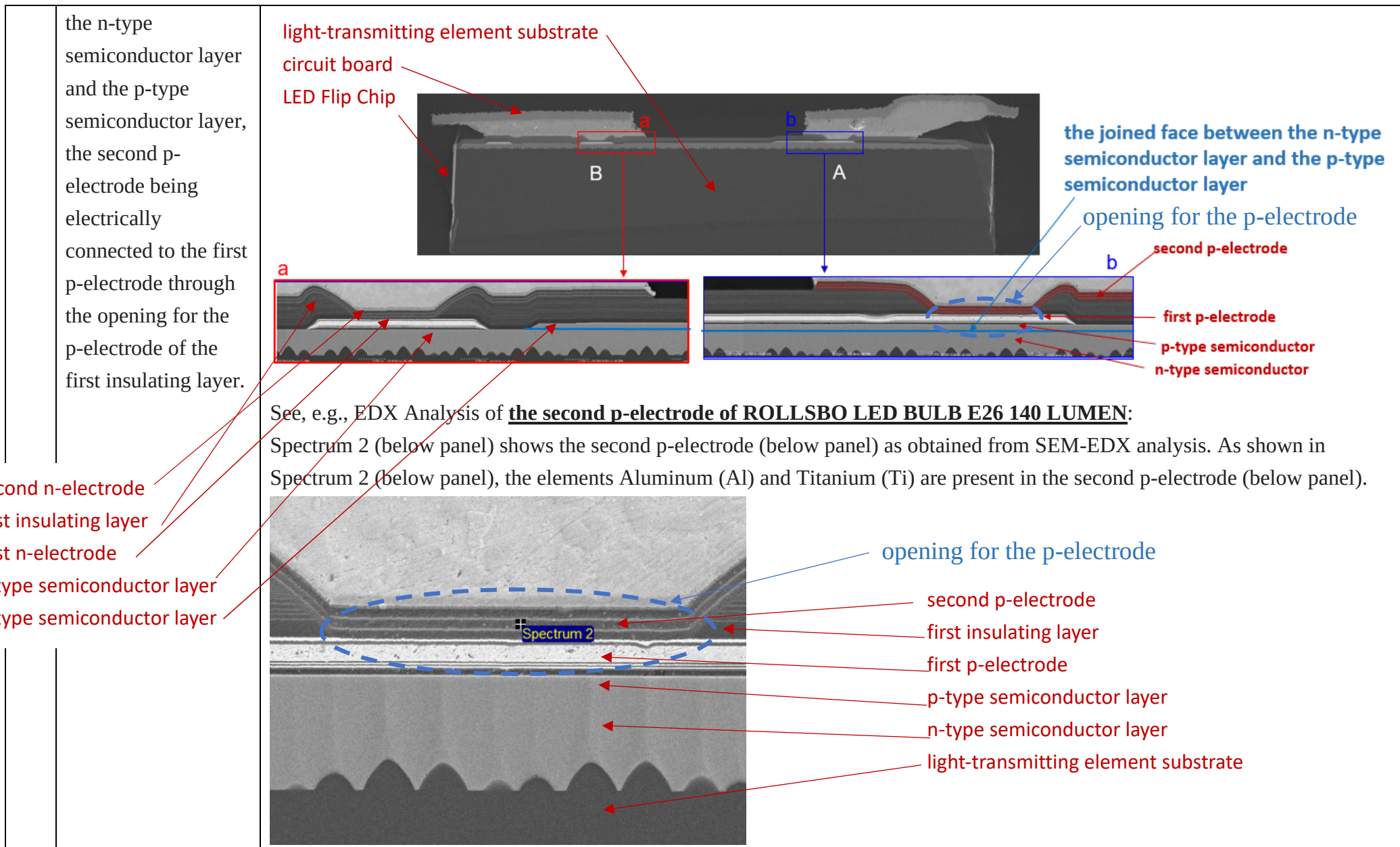
**an area of the joined face between the n-type semiconductor and the first n-electrode**

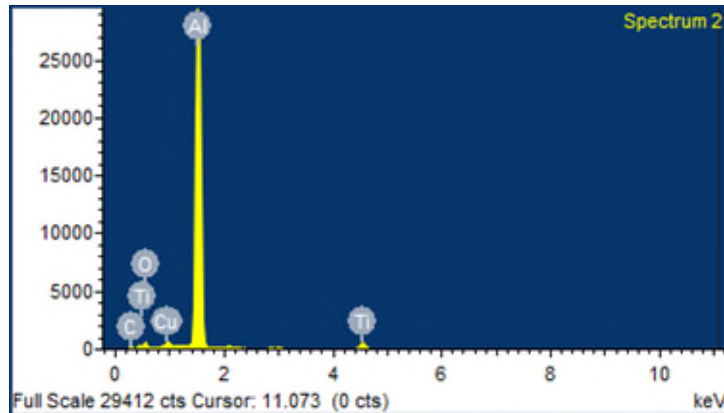


2.8 a second p-electrode formed on the first insulating layer as a thin film having an area smaller than a joined face between

The LED Flip chip in the Accused Filament Product includes a second p-electrode (e.g., Al) formed on the first insulating layer as a thin film, and the second p-electrode being electrically connected to the first p-electrode through the opening for the p-electrode of the first insulating layer.

See, e.g., enlarged images of rectangular areas in the cross-sectional image of **ROLLSBO LED BULB E26 140 LUMEN**:

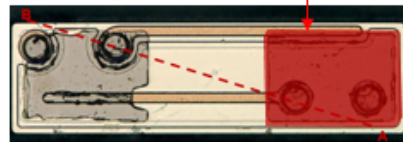




| Element | Weight% | Atomic% |
|---------|---------|---------|
| C K     | 4.37    | 9.74    |
| O K     | 3.17    | 5.30    |
| Al K    | 77.63   | 77.01   |
| Ti K    | 12.33   | 6.89    |
| Cu L    | 2.50    | 1.05    |
| Totals  | 100.00  |         |

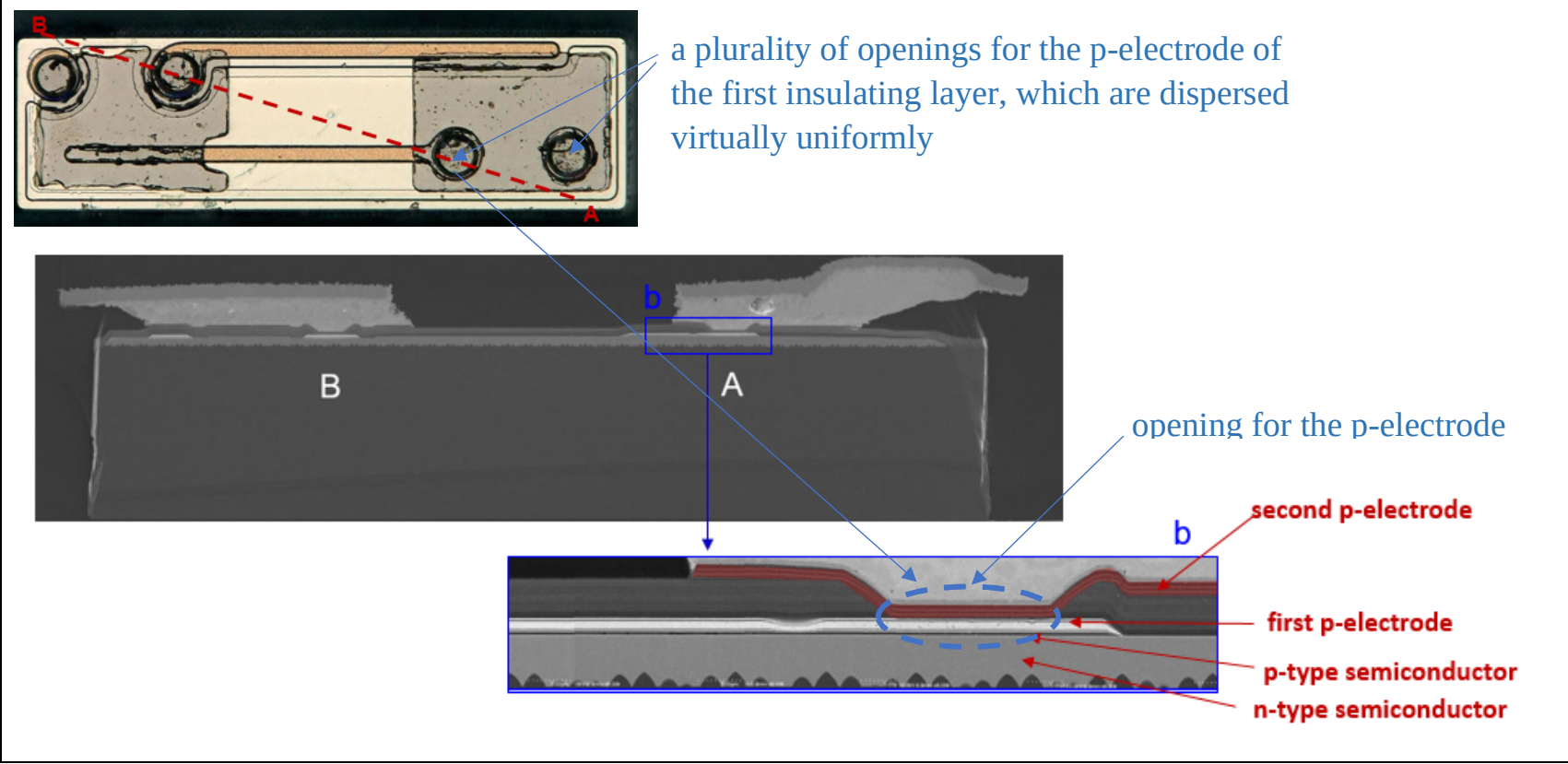
As shown below, the area of the second p-electrode is the **red area**, and the area of joined face between the n-type semiconductor layer and the p-type semiconductor layer is approximately the area outside of the first n-electrode, which is the **blue area**; therefore, the area of the second p-electrode (**red area**) is smaller than the area of the joined face between the n-type semiconductor layer and the p-type semiconductor layer (**blue area**).

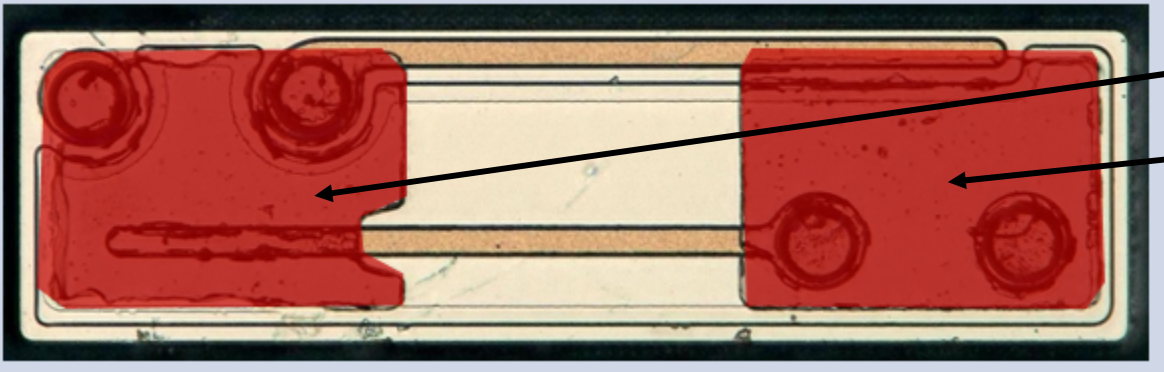
**an area of the second p-electrode**

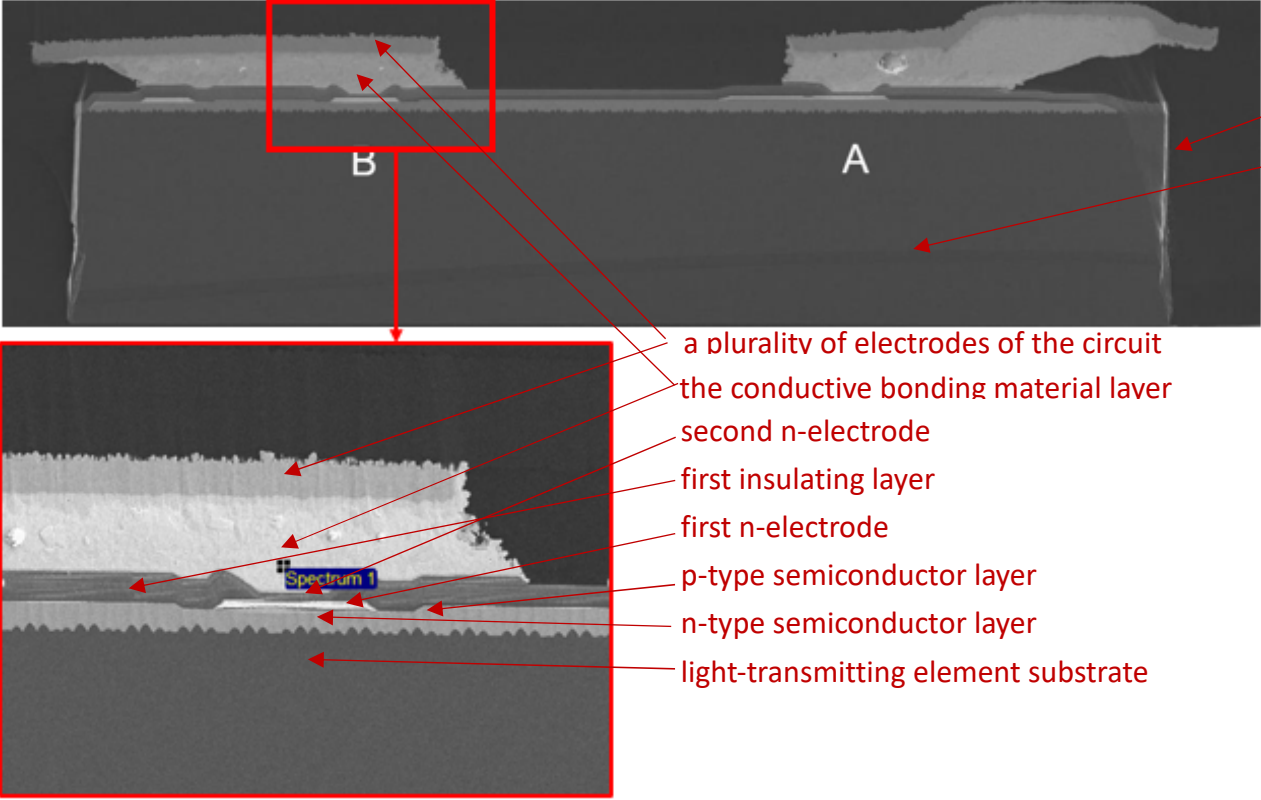


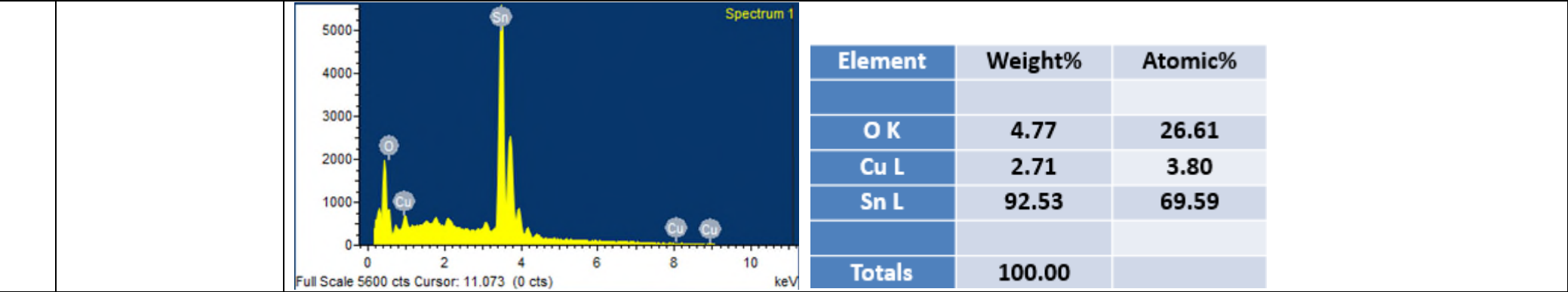
**an area of the joined face between the n-type semiconductor layer and the p-type semiconductor layer**

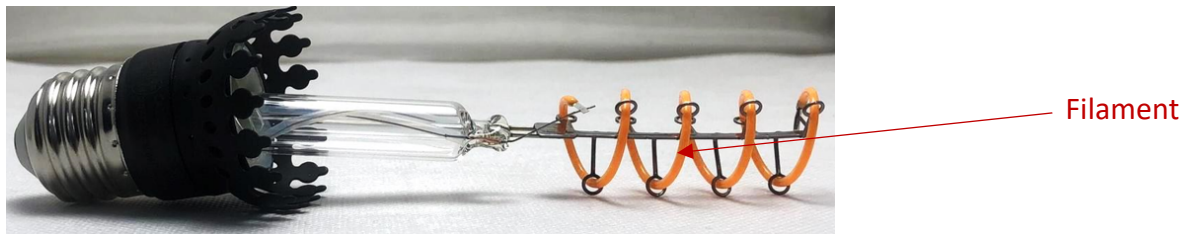


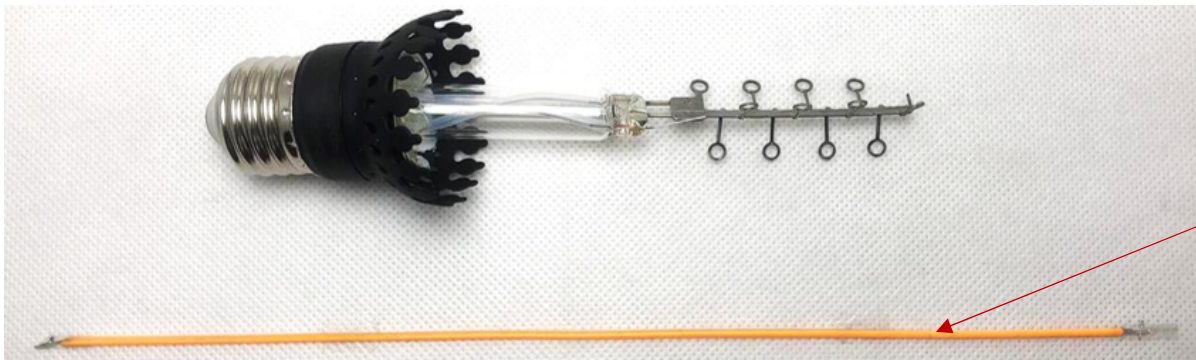
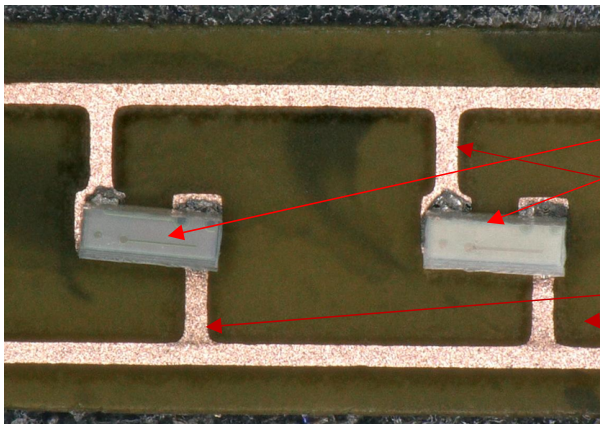
| '126 Claims Element                                                                                                                                                                                               | Elements in Accused Filament Product                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Claim 4                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <p>4.1 The semiconductor light-emitting element according to claim 2, wherein a plurality of openings for the p-electrode of the first insulating layer are formed so as to be dispersed virtually uniformly.</p> | <p>The LED Flip chip in the Accused Filament Product includes a plurality of openings for the p-electrode of the first insulating layer, and the openings for the p-electrode of the first insulating layer are dispersed virtually uniformly. See, e.g., <u>bottom view of the LED Flip chip</u> and <u>enlarged image of rectangular area in the cross-sectional image of <b>ROLLSBO LED BULB E26 140 LUMEN</b></u>:</p>  <p>a plurality of openings for the p-electrode of the first insulating layer, which are dispersed virtually uniformly</p> <p>opening for the p-electrode</p> <p>second p-electrode</p> <p>first p-electrode</p> <p>p-type semiconductor</p> <p>n-type semiconductor</p> |

| '126 Claims Element                                                                                                                                           | Elements in Accused Filament Product                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Claim 5                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <p>5.1 The semiconductor light-emitting element according to claim 1, wherein the second n-electrode and the second p-electrode have virtually same size.</p> | <p>In the LED Flip chip of the Accused Filament Product, the second n-electrode and the second p-electrode have virtually same size.</p> <p>See, e.g., <u>bottom view of the LED Flip chip</u> and <u>enlarged image of rectangular area in the cross-sectional image of <b>ROLLSBO LED BULB E26 140 LUMEN</b></u>:</p> <p>The left red area is the area of the second n-electrode and the right red area is the area of the second p-electrode, the the two areas have the same size.</p> <div data-bbox="483 552 2033 944">  <p>second n-electrode</p> <p>second p-electrode</p> </div> |

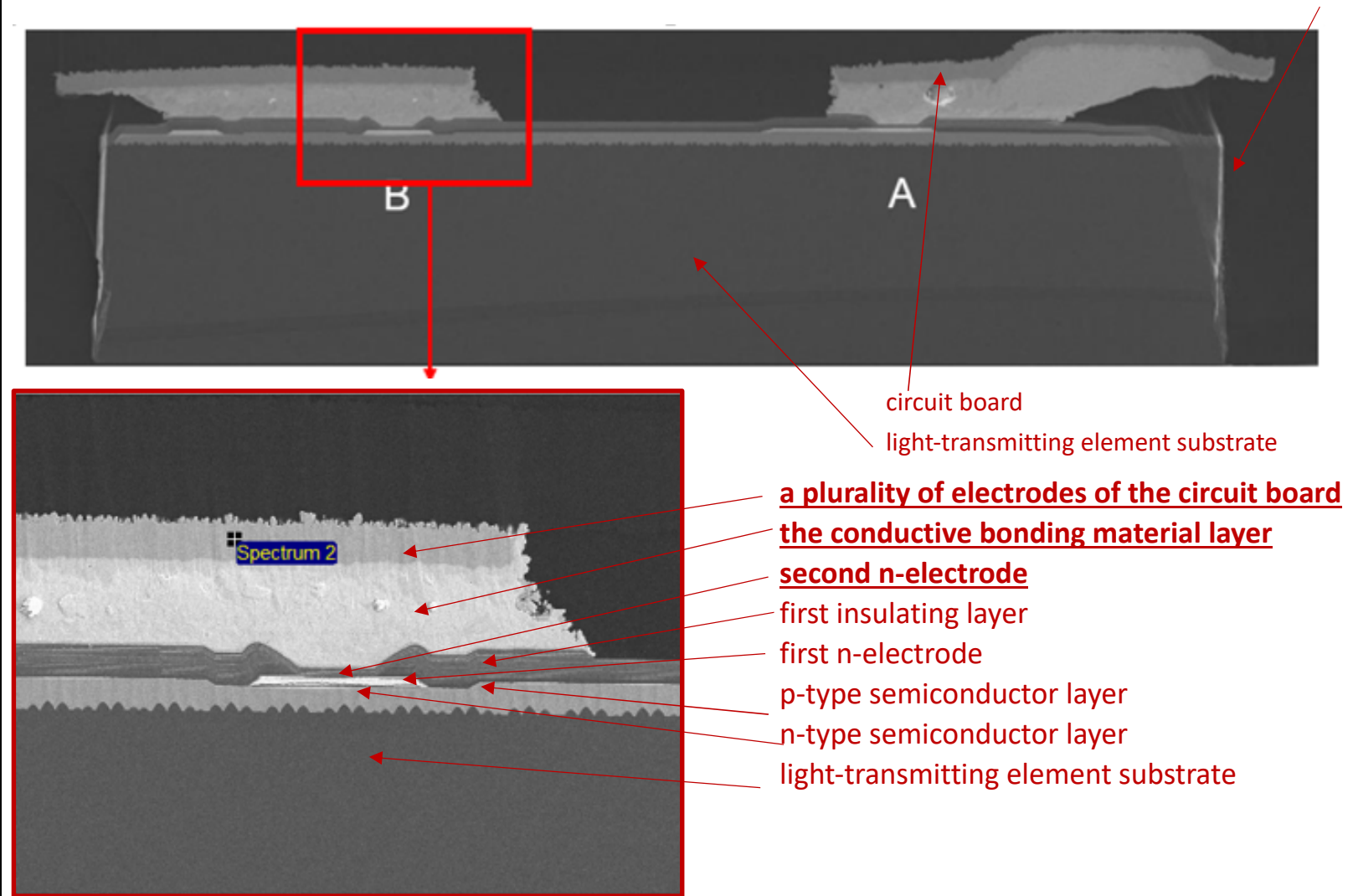
| '126 Claims Element                                                                                                                                                                                                                          | Elements in Accused Filament Product                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Claim 6                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <p>6.1 The semiconductor light-emitting element according to claim 1, wherein the conductive bonding material layer is any one of the members selected from a group consisting of solder, silver paste and anisotropic conductive resin.</p> | <p>In the Accused Filament Product, the conductive bonding material layer is any one of the members selected from a group consisting of solder, silver paste and anisotropic conductive resin.</p> <p>See, e.g., EDX Analysis of <b><u>the second p-electrode of ROLLSBO LED BULB E26 140 LUMEN:</u></b></p> <p>Spectrum 1 (below panel) shows the conductive bonding material layer (below panel) as obtained from SEM-EDX analysis. As shown in Spectrum 1 (below panel), the elements Tin (Sn) are present in the conductive bonding material layer (below panel), which is consistent with the conductive bonding material layer comprising solder.</p>  <p>LED Flip Chip</p> <p>light-transmitting element substrate</p> <p>a plurality of electrodes of the circuit</p> <p>the conductive bonding material layer</p> <p>second n-electrode</p> <p>first insulating layer</p> <p>first n-electrode</p> <p>p-type semiconductor layer</p> <p>n-type semiconductor layer</p> <p>light-transmitting element substrate</p> |

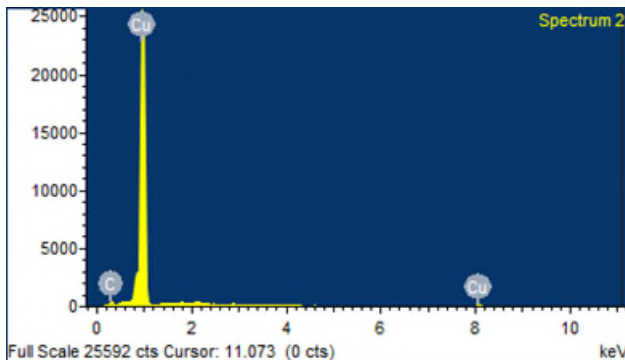


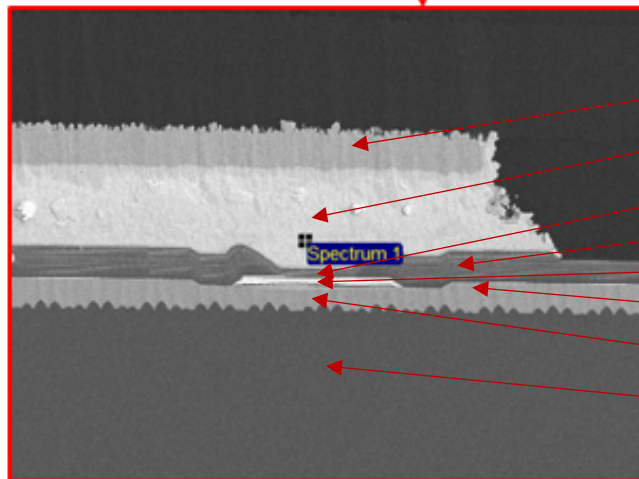
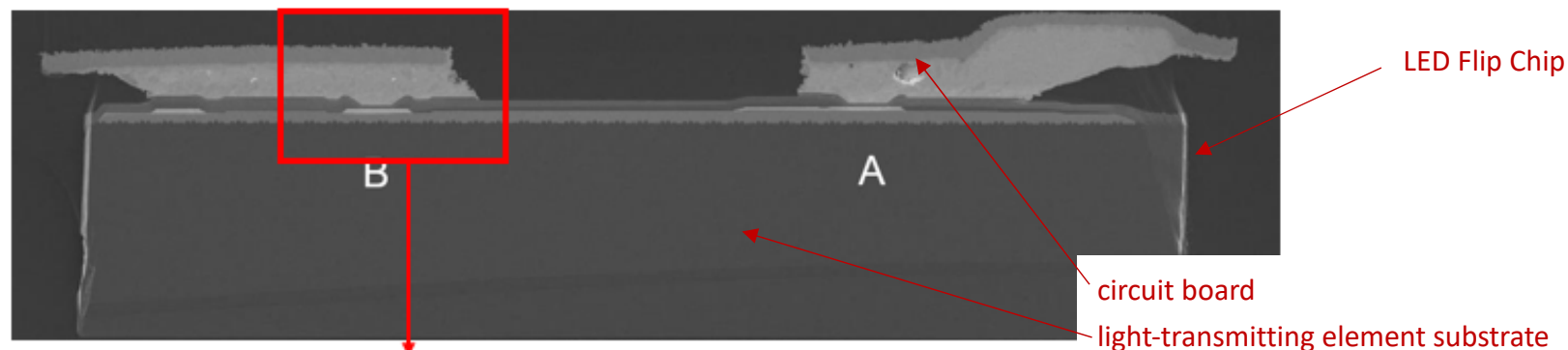
| '126 Claims Element                     | Elements in Accused Filament Product                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Claim 7                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 7.0 A light-emitting device comprising: | <p data-bbox="472 247 1227 288">The Accused Filament Product are light-emitting devices.</p> <p data-bbox="472 288 712 330">See, for example:</p> <p data-bbox="472 330 1061 371"><b><u>ROLLSBO LED BULB E26 140 LUMEN:</u></b></p> <div data-bbox="490 405 1462 654"></div> <p data-bbox="472 683 2130 772">The filament within in the Accused Filament Product includes the circuit boards and the LED Flip Chips that are surrounding by yellow sealing members.</p> <div data-bbox="481 775 1659 1010"></div> |

|     |                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-----|----------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|     |                                                                |  <p>Filament</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 7.1 | the semiconductor light-emitting element according to claim 1; | See claim 1.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 7.2 | a circuit board having a plurality of electrodes;              | <p>The Accused Filament Product include a circuit board having a plurality of electrodes, and the LED Flip Chips are mounted on the circuit board. The LED Flip Chips in the Accused Filament Product are semiconductor light-emitting elements.</p>  <p>LED Flip Chips (semiconductor light-emitting elements)</p> <p>a plurality of electrodes of the circuit board</p> <p>circuit board</p> <p>See, e.g., EDX Analysis of <b><u>the second p-electrode of ROLLSBO LED BULB E26 140 LUMEN:</u></b><br/>Spectrum 2 (below panel) shows the electrodes of the circuit board (below panel) as obtained from SEM-EDX analysis. As shown</p> |

in Spectrum 2 (below panel), the elements Copper (Cu) are present in the electrodes of the circuit board (below panel), which is consistent with the the circuit board having a plurality of electrodes.



|         |                                                                                                                                                                    |  <table><thead><tr><th>Element</th><th>Weight%</th><th>Atomic%</th></tr></thead><tbody><tr><td></td><td></td><td></td></tr><tr><td>C K</td><td>4.90</td><td>21.43</td></tr><tr><td>Cu L</td><td>95.10</td><td>78.57</td></tr><tr><td></td><td></td><td></td></tr><tr><td>Totals</td><td>100.00</td><td></td></tr></tbody></table>                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Element | Weight% | Atomic% |  |  |  | C K | 4.90 | 21.43 | Cu L | 95.10 | 78.57 |  |  |  | Totals | 100.00 |  |
|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|---------|---------|--|--|--|-----|------|-------|------|-------|-------|--|--|--|--------|--------|--|
| Element | Weight%                                                                                                                                                            | Atomic%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |         |         |         |  |  |  |     |      |       |      |       |       |  |  |  |        |        |  |
|         |                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |         |         |         |  |  |  |     |      |       |      |       |       |  |  |  |        |        |  |
| C K     | 4.90                                                                                                                                                               | 21.43                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |         |         |         |  |  |  |     |      |       |      |       |       |  |  |  |        |        |  |
| Cu L    | 95.10                                                                                                                                                              | 78.57                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |         |         |         |  |  |  |     |      |       |      |       |       |  |  |  |        |        |  |
|         |                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |         |         |         |  |  |  |     |      |       |      |       |       |  |  |  |        |        |  |
| Totals  | 100.00                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |         |         |         |  |  |  |     |      |       |      |       |       |  |  |  |        |        |  |
| 7.3     | a conductive bonding material layer that electrically connects and fixes the second n-electrode and the second p-electrode to the electrodes on the circuit board. | <p>The Accused Filament Product include a conductive bonding material layer between the second n-electrode/the second p-electrode and the electrodes on the circuit board, and electrically connects and fixes the second n-electrode and the second p-electrode to the electrodes on the circuit board.</p> <p>See, e.g., EDX Analysis of <b><u>the second p-electrode of ROLLSBO LED BULB E26 140 LUMEN:</u></b></p> <p>Spectrum 1 (below panel) shows the conductive bonding material layer (below panel) as obtained from SEM-EDX analysis. As shown in Spectrum 1 (below panel), the elements Tin (Sn) are present in the conductive bonding material layer (below panel), which is consistent with the conductive bonding material layer electrically connecting and fixing the second n-electrode and the second p-electrode to the electrodes on the circuit board.</p> |         |         |         |  |  |  |     |      |       |      |       |       |  |  |  |        |        |  |



**a plurality of electrodes of the circuit board**

**the conductive bonding material layer**

**second n-electrode**

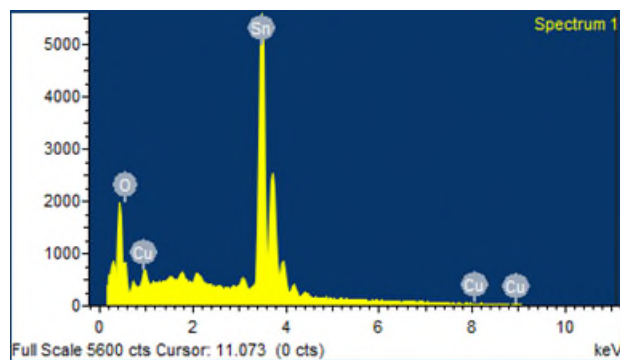
first insulating layer

first n-electrode

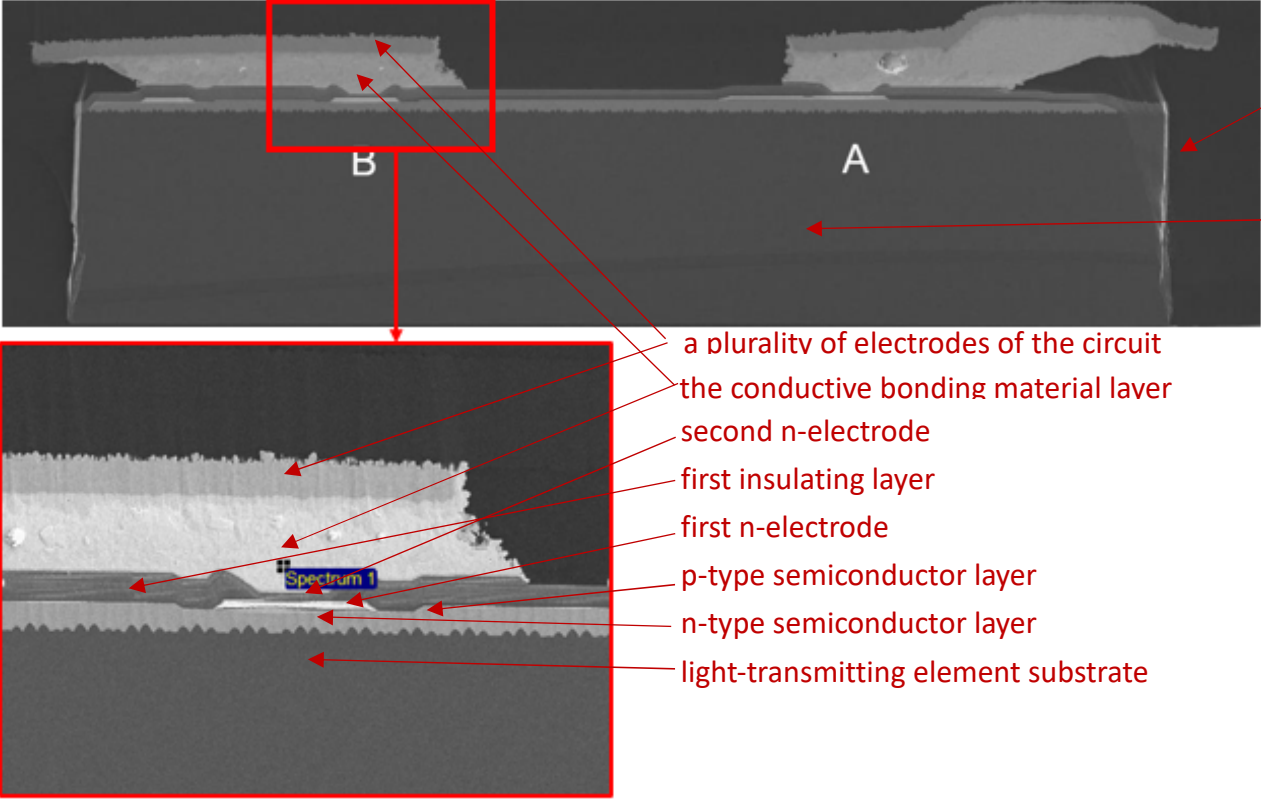
p-type semiconductor layer

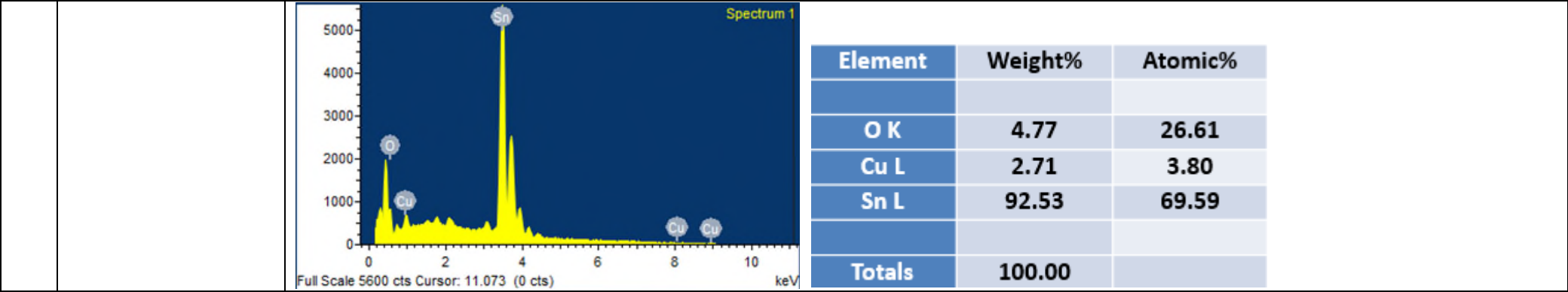
n-type semiconductor layer

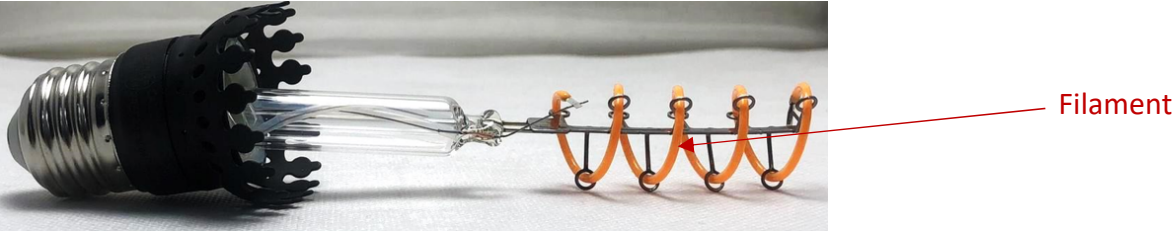
light-transmitting element substrate

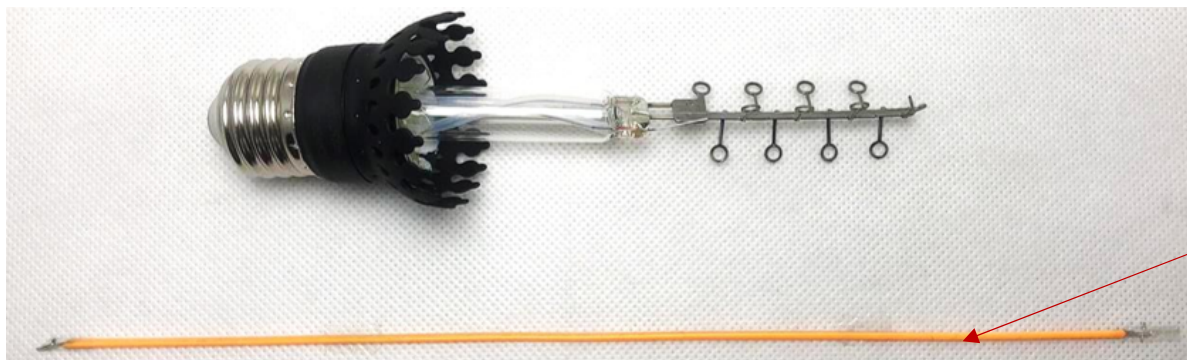


| Element | Weight% | Atomic% |
|---------|---------|---------|
| O K     | 4.77    | 26.61   |
| Cu L    | 2.71    | 3.80    |
| Sn L    | 92.53   | 69.59   |
| Totals  | 100.00  |         |

| '126 Claims Element                                                                                                                                                                                                                          | Elements in Accused Filament Product                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Claim 8                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <p>8.1 The semiconductor light-emitting element according to claim 1, wherein the conductive bonding material layer is any one of the members selected from a group consisting of solder, silver paste and anisotropic conductive resin.</p> | <p>In the Accused Filament Product, the conductive bonding material layer is any one of the members selected from a group consisting of solder, silver paste and anisotropic conductive resin.</p> <p>See, e.g., EDX Analysis of <b><u>the second p-electrode of ROLLSBO LED BULB E26 140 LUMEN:</u></b></p> <p>Spectrum 1 (below panel) shows the conductive bonding material layer (below panel) as obtained from SEM-EDX analysis. As shown in Spectrum 1 (below panel), the elements Tin (Sn) are present in the conductive bonding material layer (below panel), which is consistent with the conductive bonding material layer comprising solder.</p>  <p>LED Flip Chip</p> <p>light-transmitting element substrate</p> <p>a plurality of electrodes of the circuit</p> <p>the conductive bonding material layer</p> <p>second n-electrode</p> <p>first insulating layer</p> <p>first n-electrode</p> <p>p-type semiconductor layer</p> <p>n-type semiconductor layer</p> <p>light-transmitting element substrate</p> |

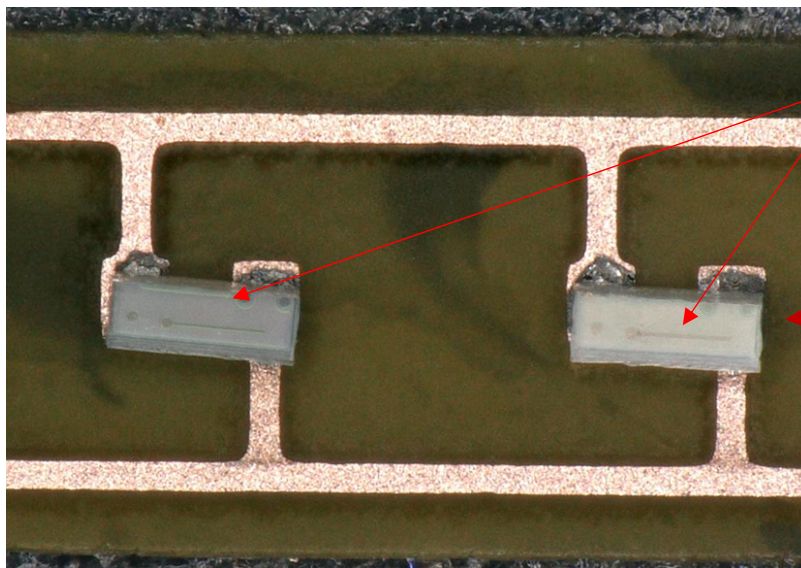


| '126 Claims Element                                                                      | Elements in Accused Filament Product                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Claim 9                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <p>9.0 A method for manufacturing a semiconductor light-emitting element comprising:</p> | <p>The Accused Filament Product are light-emitting devices made by the claimed method.</p> <p>The LED Flip Chips mounted on the circuit board in the Accused Filament Product are semiconductor light-emitting elements.</p> <p>The method for manufacturing the LED Flip Chips in the Accused Filament Product is the method for manufacturing a semiconductor light-emitting element.</p> <p>See, for example:</p> <p><b><u>ROLLSBO LED BULB E26 140 LUMEN:</u></b></p>  <p>The filament within in the Accused Filament Product includes the circuit boards and the LED Flip Chips that are surrounding by yellow sealing members.</p>  |



Filament

The LED Flip Chips are mounted on the circuit board. The LED Flip Chips in the Accused Filament Product are semiconductor light-emitting elements.



LED Flip Chips (semiconductor light-emitting elements)

circuit board

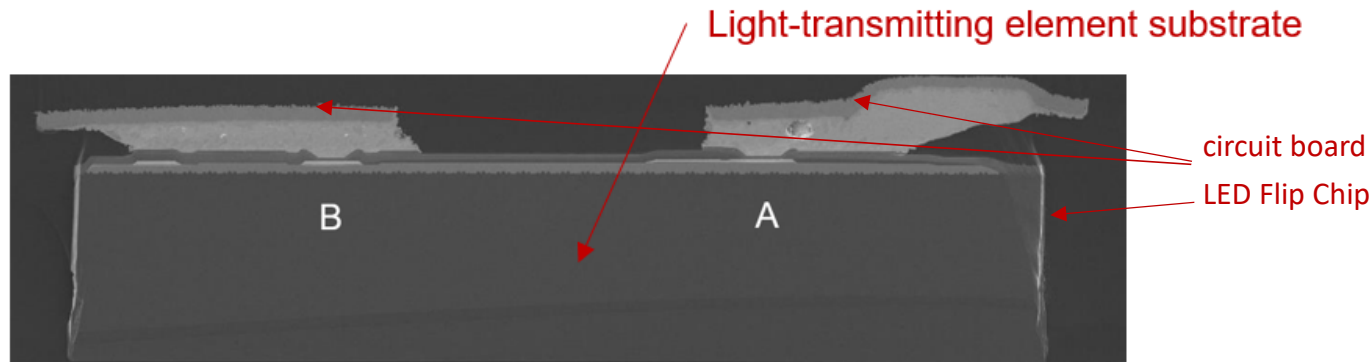
9.1 preparing a bare light-emitting element comprising

**The Accused Filament Product are made by a method that includes preparing a bare light-emitting element** comprising an n-type semiconductor layer formed on a light-transmitting element substrate so as to cover the element substrate; a p-type semiconductor layer formed on an area on the n-type semiconductor layer from which an area for the n-electrode on the n-type

|                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>an n-type semiconductor layer formed on a light-transmitting element substrate so as to cover the element substrate;</p> <p>a p-type semiconductor layer formed on an area on the n-type semiconductor layer from which an area for the n-electrode on the n-type semiconductor layer is excluded, for emitting light in cooperation with the n-type semiconductor layer;</p> <p>a first n-electrode that is a thin film formed on the area</p> | <p>semiconductor layer is excluded, for emitting light in cooperation with the n-type semiconductor layer; a first n-electrode that is a thin film formed on the area for the n-electrode of the n-type semiconductor layer; and a first p-electrode that is a thin film formed on the p-type semiconductor layer.</p> <p>The bare light-emitting element comprises a light-transmitting element substrate, an n-type semiconductor layer, a p-type semiconductor layer, a first n-electrode and a first p-electrode in sequence.</p> <p><b><u>The LED Flip Chip in the Accused Filament Product includes a light-transmitting element substrate</u></b> (e.g., a Sapphire/<math>\text{Al}_2\text{O}_3</math> substrate).</p> <p>See, e.g., cross-sectional image of <b><u>ROLLSBO LED BULB E26 140 LUMEN</u></b>:</p> <div data-bbox="483 486 1041 713" data-label="Image"> </div> <p>(Top view of the LED Flip chip)</p> <div data-bbox="483 740 1041 941" data-label="Image"> </div> <p>(Bottom view of the LED Flip chip)</p> |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

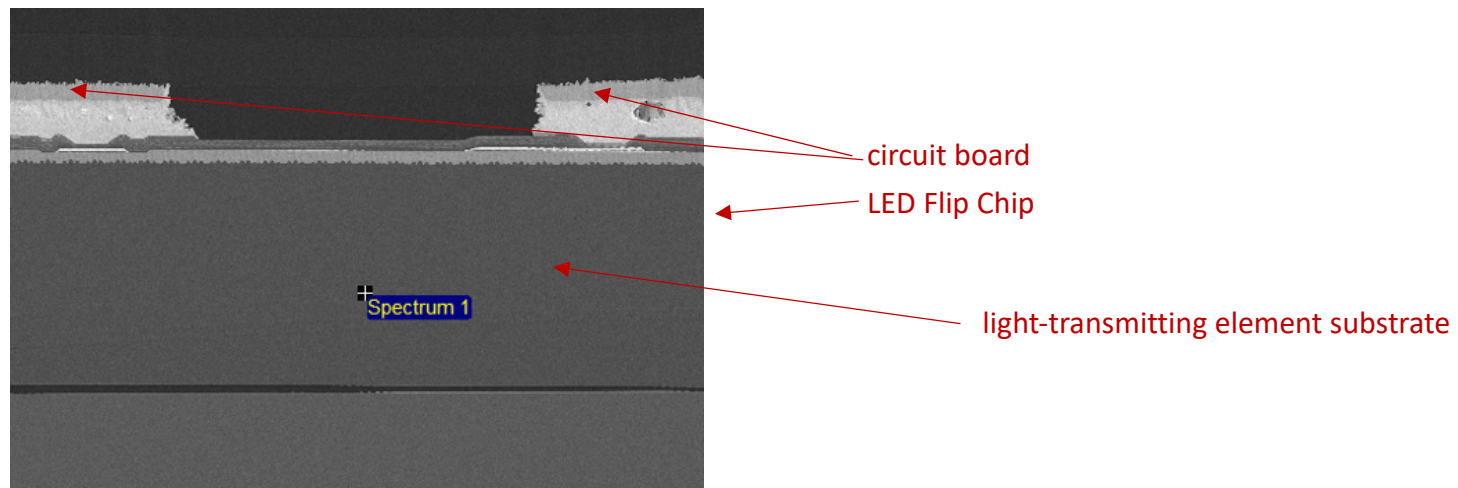
for the n-electrode of the n-type semiconductor layer; and

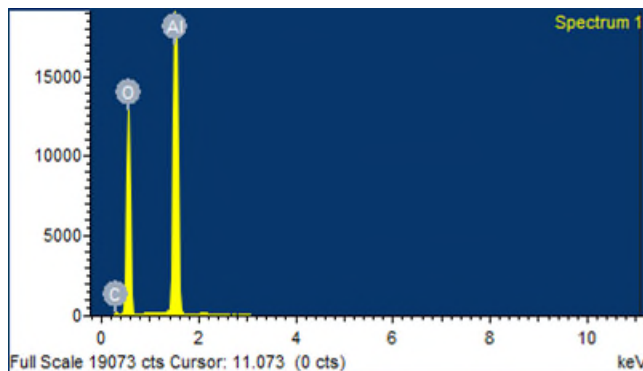
a first p-electrode that is a thin film formed on the p-type semiconductor layer;



See, e.g., SEM-EDX Analysis of **the light-transmitting element substrate of ROLLSBO LED BULB E26 140 LUMEN:**

The light-transmitting element substrate in the LED Flip Chip is sapphire that allows the light to be extracted. Spectrum 1 (below panel) shows the elemental constituents of the light-transmitting element substrate (below panel) as obtained from SEM-EDX analysis. As shown in Spectrum 1 (below panel), the elements Aluminum (Al) and Oxygen (O) are present in the light-transmitting element substrate (below panel), which is consistent with the light-transmitting element substrate comprising sapphire ( $\text{Al}_2\text{O}_3$ ).

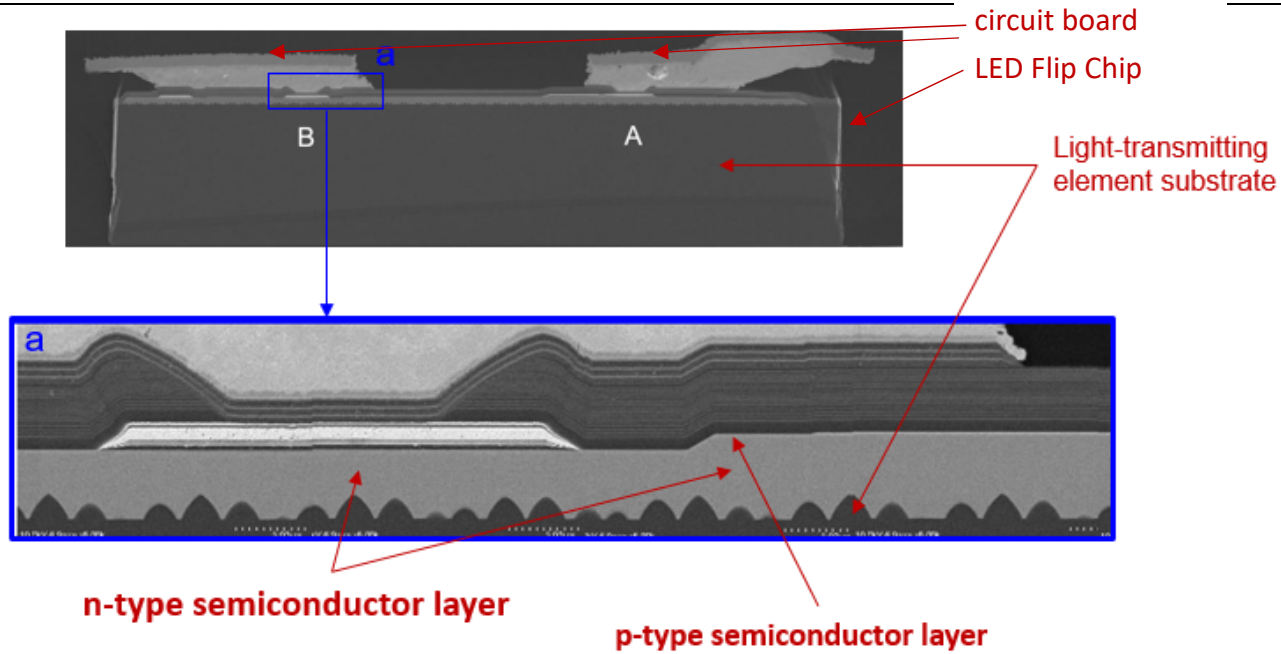




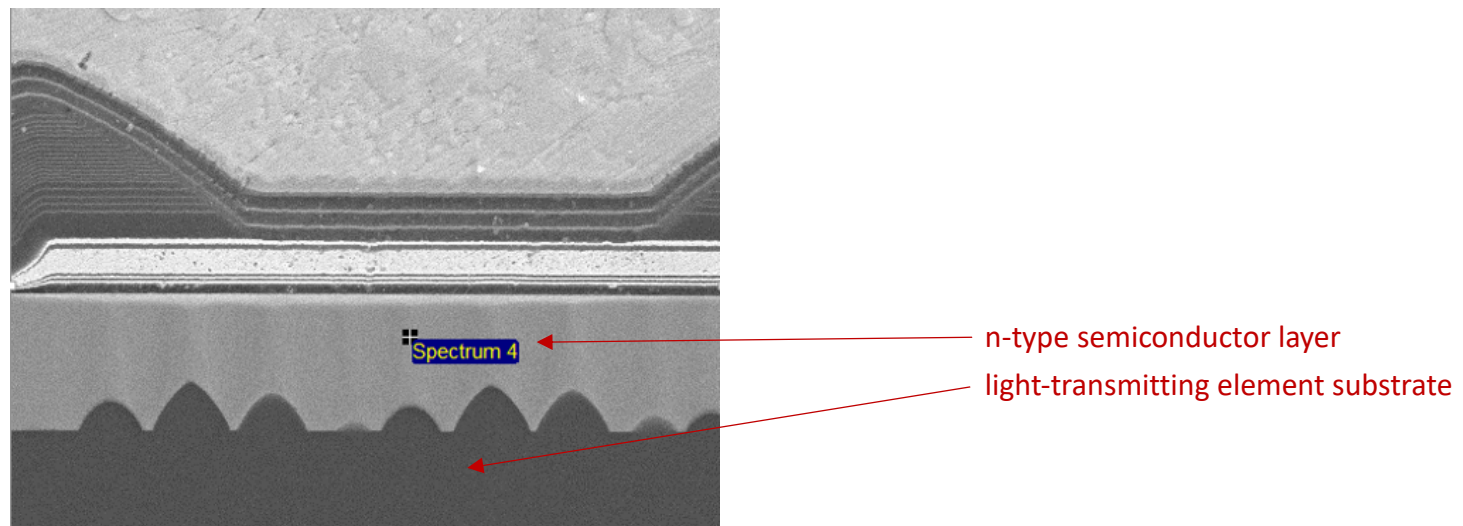
| Element | Weight% | Atomic% |
|---------|---------|---------|
| C K     | 2.94    | 4.77    |
| O K     | 50.73   | 61.78   |
| Al K    | 46.33   | 33.46   |
| Totals  | 100.00  |         |

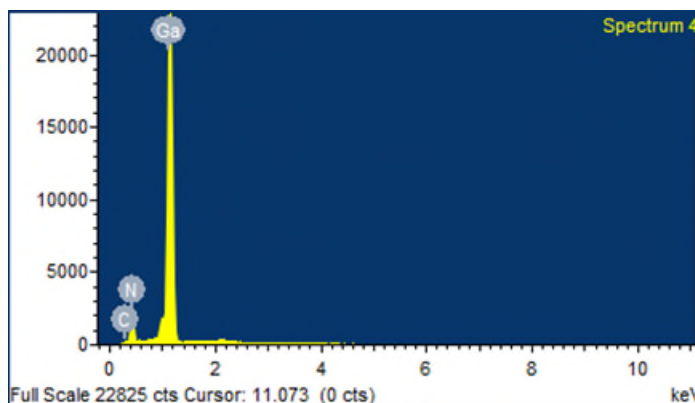
**The LED Flip chip in the Accused Product includes an n-type semiconductor layer (e.g., GaN), and the n-type semiconductor layer form on and cover the element substrate.**

See, e.g., enlarged image of rectangular area in the cross-sectional image of **ROLLSBO LED BULB E26 140 LUMEN**:  
 The gallium nitride (GaN) layer of the LED Flip Chip is n-type semiconductor layer formed on the element substrate so as to cover the element substrate. Spectrum 4 (below panel) shows the elemental constituents of a layer of the LED (below panel) as obtained from SEM-EDX analysis. As shown in Spectrum 4 (below panel), the elements Gallium (Ga) and Nitrogen (N) are present in the n-type semiconductor layer (below panel), which is consistent with the LED Flip Chip comprising Gallium Nitride (GaN).



See, e.g., EDX Analysis of the n-type semiconductor layer of ROLLSBO LED BULB E26 140 LUMEN:

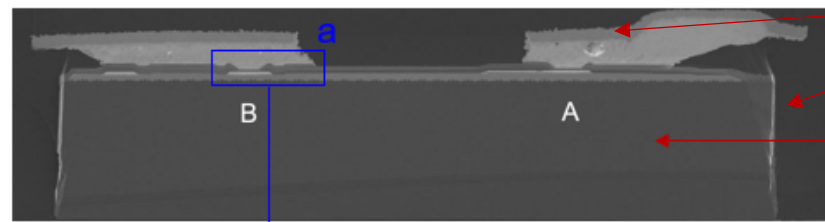




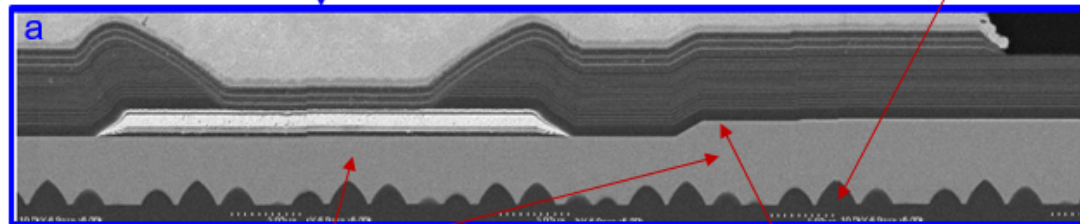
| Element | Weight% | Atomic% |
|---------|---------|---------|
|         |         |         |
| C K     | 2.83    | 8.68    |
| N K     | 19.05   | 50.07   |
| Ga L    | 78.12   | 41.25   |
|         |         |         |
| Totals  | 100.00  |         |

**The LED Flip chip in the Accused Product includes a p-type semiconductor layer (e.g., GaN), and the p-type semiconductor layer form on and cover the n-type semiconductor layer for emitting light, but an area for an n-electrode on the n-type semiconductor layer isn't covered by p-type semiconductor layer.**

See, e.g., enlarged image of rectangular area in the cross-sectional image of **ROLLSBO LED BULB E26 140 LUMEN**: The gallium nitride (GaN) layer of the LED Flip Chip is p-type semiconductor layer so as to cover an area on the n-type semiconductor layer from which an area for an n-electrode on the n-type semiconductor layer is excluded, for emitting light in cooperation with the n-type semiconductor layer. Spectrum 2 (below panel) shows the elemental constituents of a layer of the LED (below panel) as obtained from SEM-EDX analysis. As shown in Spectrum 2 (below panel), the elements Gallium (Ga) and Nitrogen (N) are present in the p-type semiconductor layer (below panel), which is consistent with the LED Flip Chip comprising Gallium Nitride (GaN).



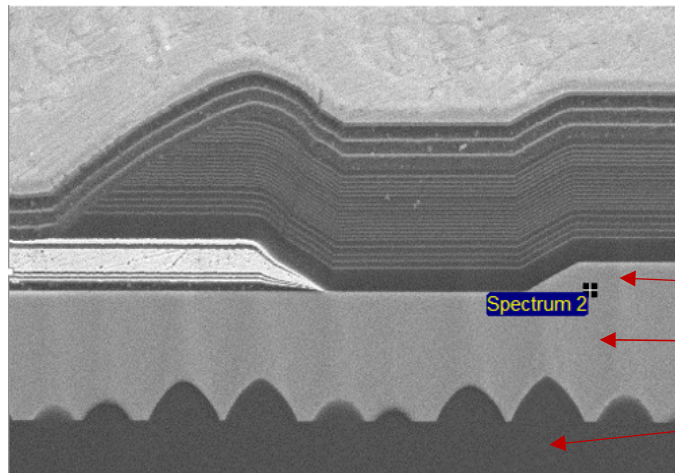
circuit board  
LED Flip Chip  
Light-transmitting  
element substrate



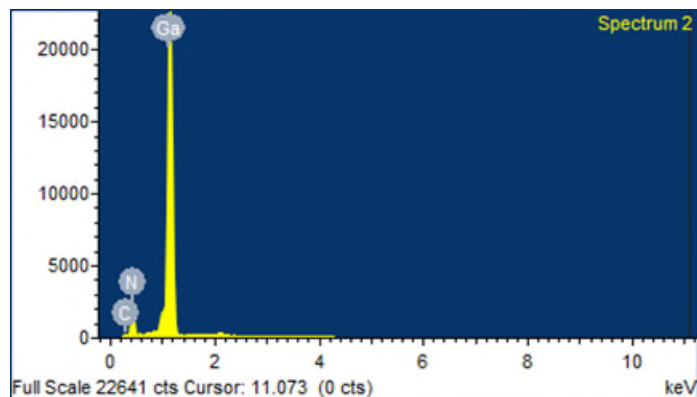
n-type semiconductor layer

p-type semiconductor layer

See, e.g., EDX Analysis of the p-type semiconductor layer of ROLLSBO LED BULB E26 140 LUMEN:



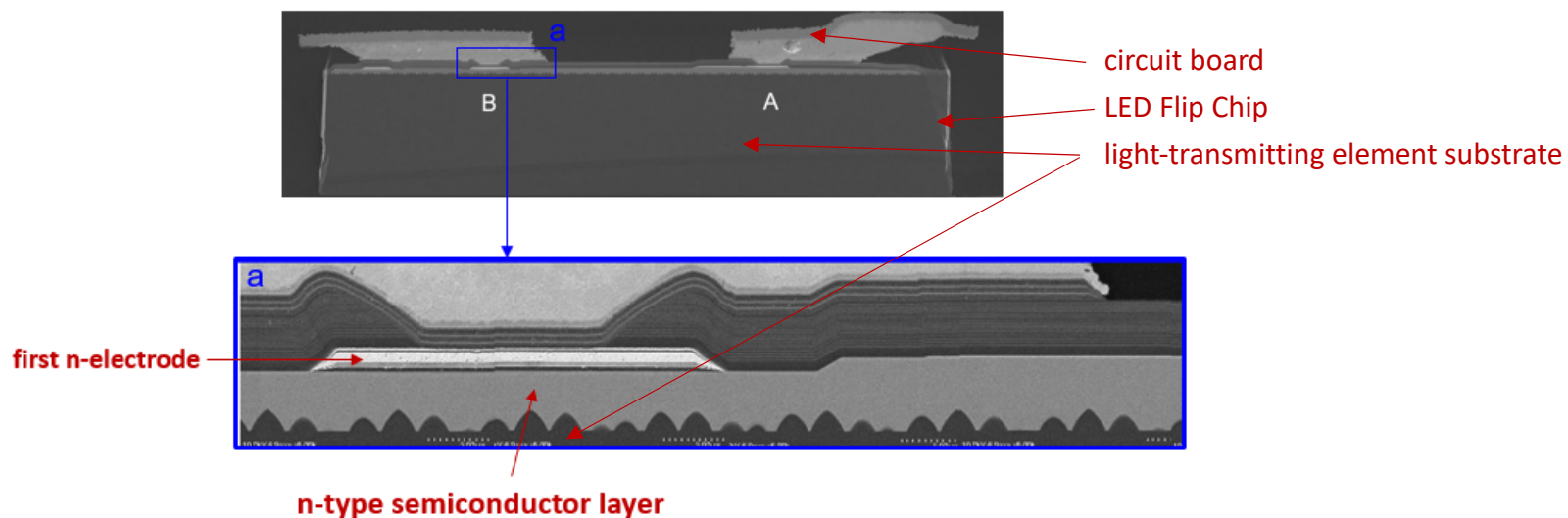
p-type semiconductor layer  
n-type semiconductor layer  
light-transmitting element substarte



| Element | Weight% | Atomic% |
|---------|---------|---------|
| C K     | 3.03    | 9.26    |
| N K     | 18.94   | 49.65   |
| Ga L    | 78.03   | 41.09   |
| Totals  | 100.00  |         |

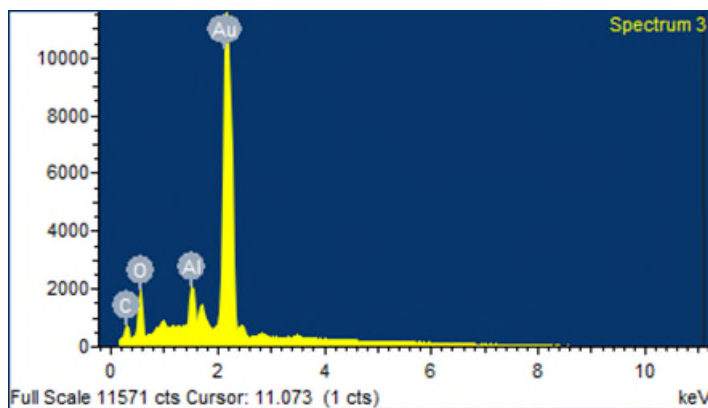
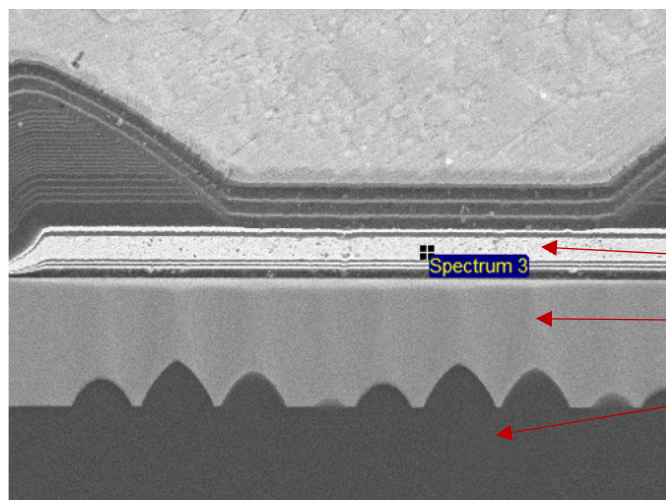
**The LED Flip chip in the Accused Product includes a first n-electrode (e.g., Au) that is a thin film formed on the area for the n-electrode of the n-type semiconductor layer.**

See, e.g., enlarged image of rectangular area in the cross-sectional image of **ROLLSBO LED BULB E26 140 LUMEN**:



See, e.g., EDX Analysis of **the first n-electrode of ROLLSBO LED BULB E26 140 LUMEN**:

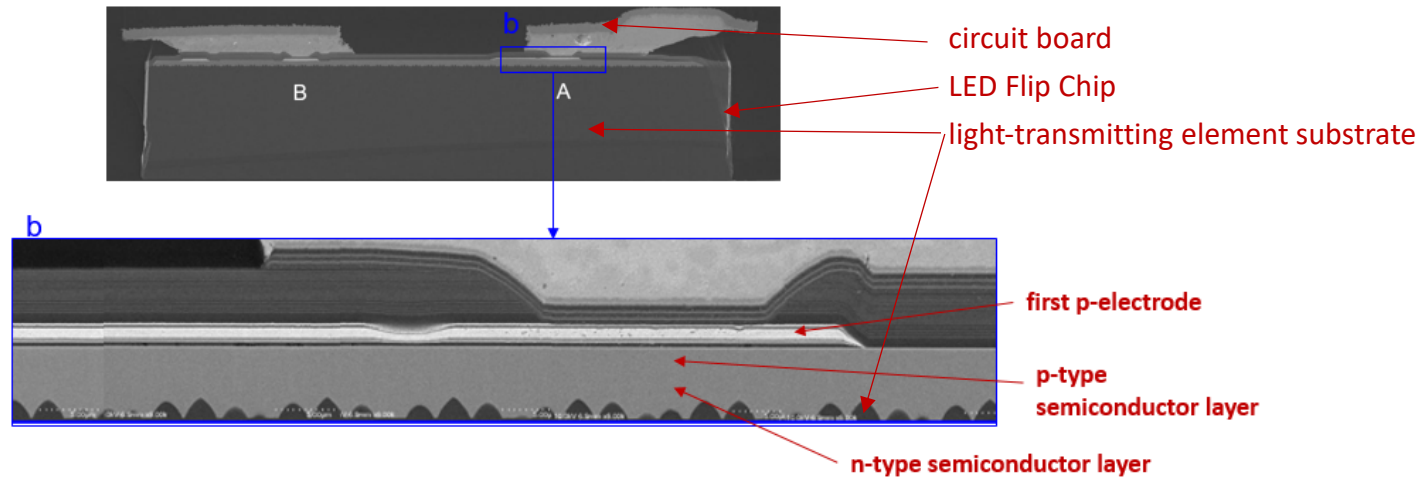
Spectrum 3 (below panel) shows the n-type electrode (below panel) as obtained from SEM-EDX analysis. As shown in Spectrum 3 (below panel), the elements Gold (Au) and Aluminum (Al) are present in the first n-electrode (below panel).



| Element | Weight% | Atomic% |
|---------|---------|---------|
| C K     | 3.63    | 23.11   |
| O K     | 7.80    | 37.26   |
| Al K    | 2.15    | 6.08    |
| Au M    | 86.43   | 33.55   |
| Totals  | 100.00  |         |

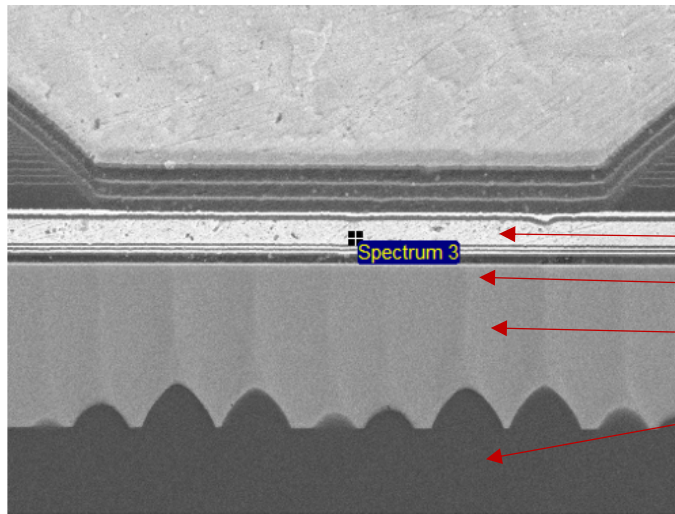
**The LED Flip chip in the Accused Product includes a first p-electrode (e.g., Au and Pt) that is a thin film formed on the p-type semiconductor layer.**

See, e.g., enlarged image of rectangular area in the cross-sectional image of **ROLLSBO LED BULB E26 140 LUMEN**:

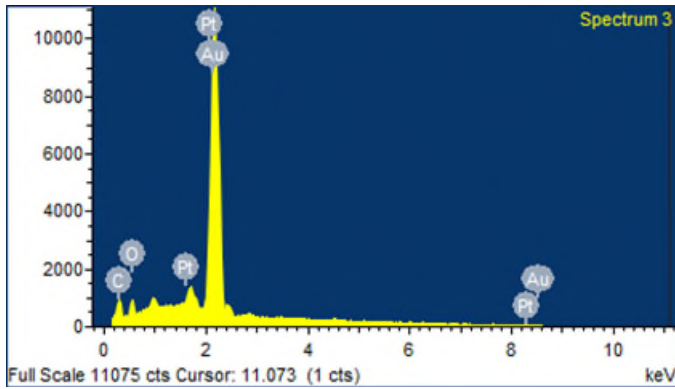


See, e.g., EDX Analysis of **the first p-electrode of ROLLSBO LED BULB E26 140 LUMEN**:

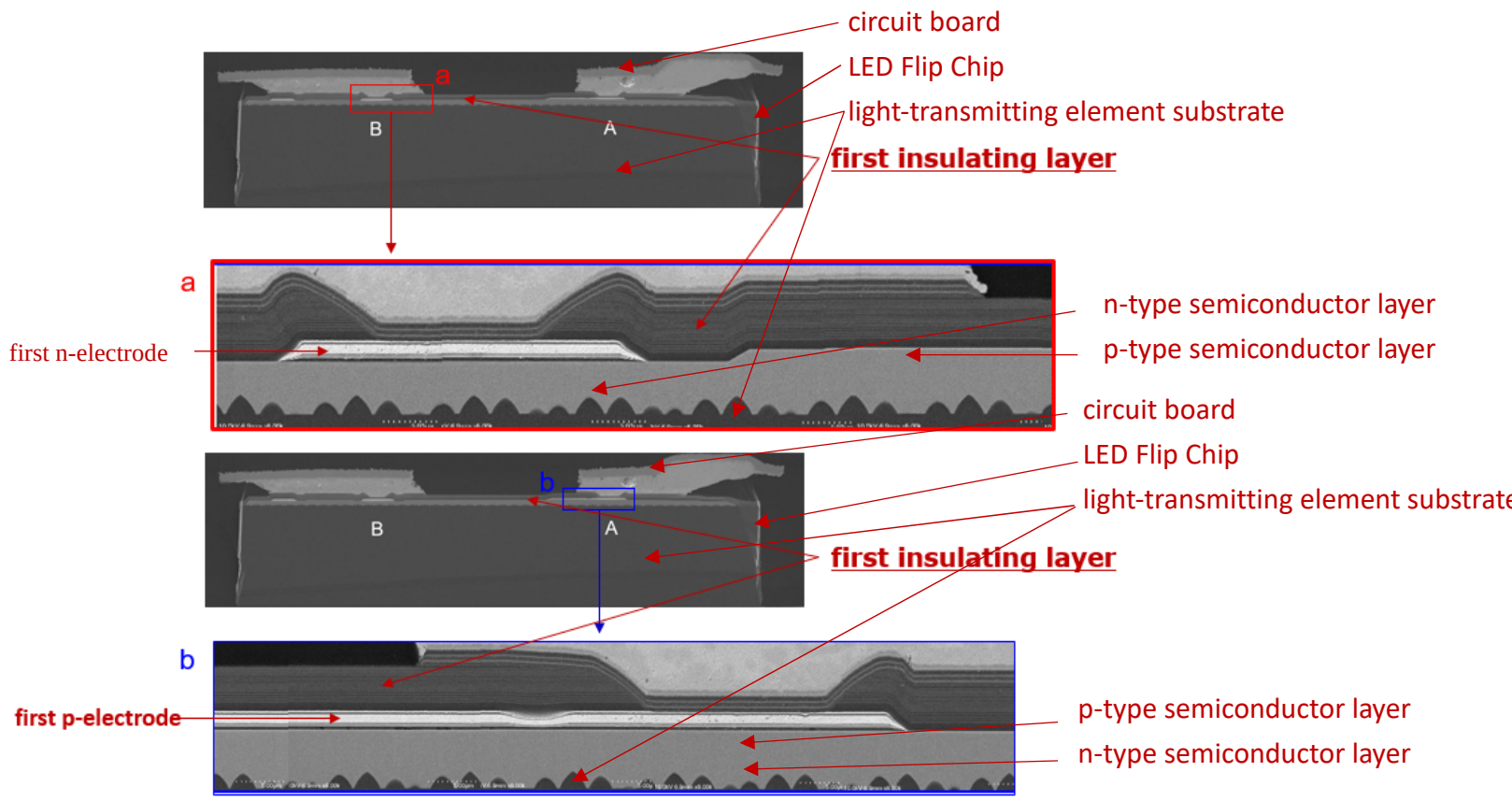
Spectrum 3 (below panel) shows the n-type electrode (below panel) as obtained from SEM-EDX analysis. As shown in Spectrum 3 (below panel), the elements Gold (Au) and Platinum (Pt) are present in the first p-electrode (below panel).



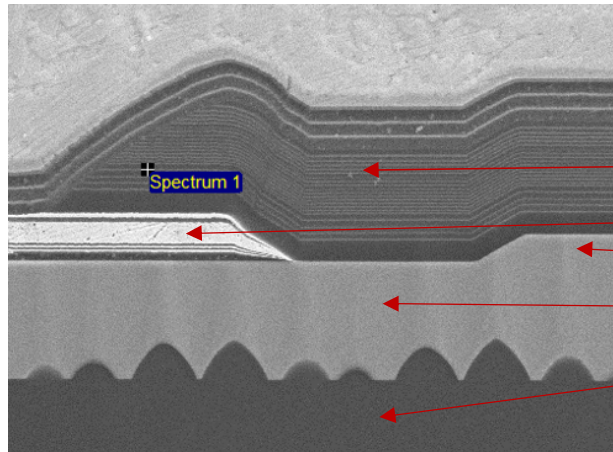
first p-electrode  
p-type semiconductor layer  
n-type semiconductor layer  
light-transmitting element substrate



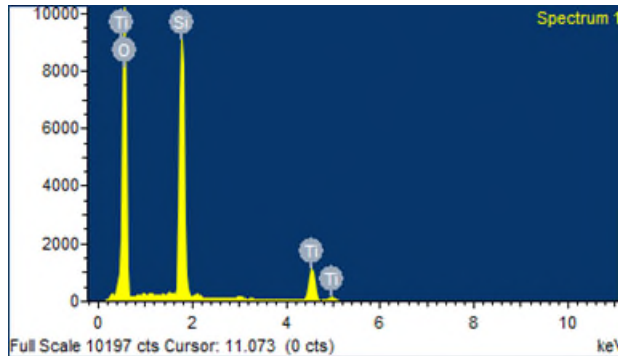
| Element | Weight% | Atomic% |
|---------|---------|---------|
| C K     | 4.60    | 36.89   |
| O K     | 2.96    | 17.82   |
| Pt M    | 20.83   | 10.28   |
| Au M    | 71.61   | 35.02   |
| Totals  | 100.00  |         |

|                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|--------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>9.2 forming a first insulating layer so as to insulate the first n-electrode and the first p-electrode from each other;</p> | <p><b><u>The Accused Filament Product are made by a method that includes forming a first insulating layer so as to insulate the first n-electrode and the first p-electrode from each other element.</u></b></p> <p>The LED Flip chip in the Accused Filament Product includes a first insulating layer (e.g., SiO<sub>x</sub> and TiO<sub>x</sub>) that is formed on the first n-electrode and the first p-electrode after preparing a bare light-emitting element and insulate them from each other.</p> <p>See, e.g., enlarged images of rectangular areas in the cross-sectional image of <b><u>ROLLSBO LED BULB E26 140 LUMEN</u></b>:</p>  <p>See, e.g., EDX Analysis of <b><u>the first insulating layer of ROLLSBO LED BULB E26 140 LUMEN</u></b>:<br/>Spectrum 1 (below panel) shows the first insulating layer (below panel) as obtained from SEM-EDX analysis. As shown in</p> |
|--------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

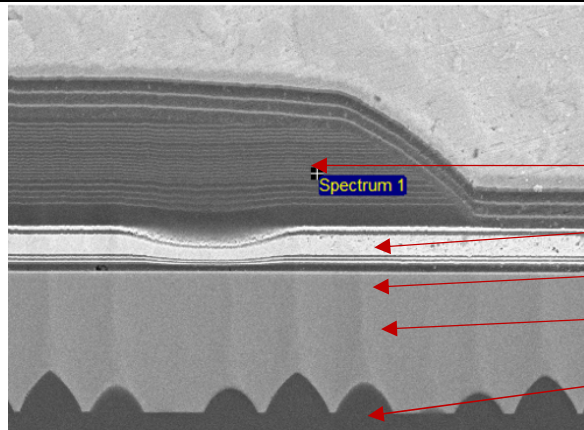
Spectrum 1 (below panel), the elements Silicon (Si), Titanium (Ti) and Oxygen are present in the first insulating layer (below panel), which is consistent with the LED Flip Chip comprising Silicon Oxide ( $\text{SiO}_x$ ) and Titanium Oxide( $\text{TiO}_x$ ).



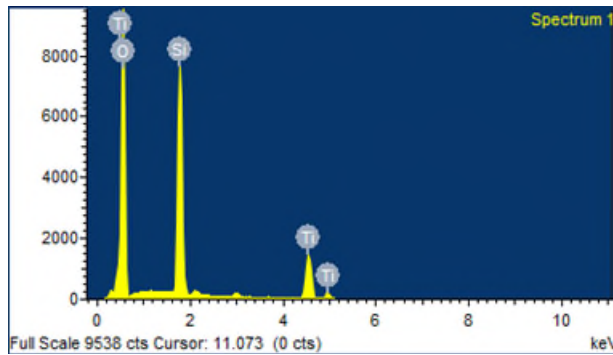
first insulating layer  
first n-electrode  
p-type semiconductor layer  
n-type semiconductor layer  
light-transmitting element substrate



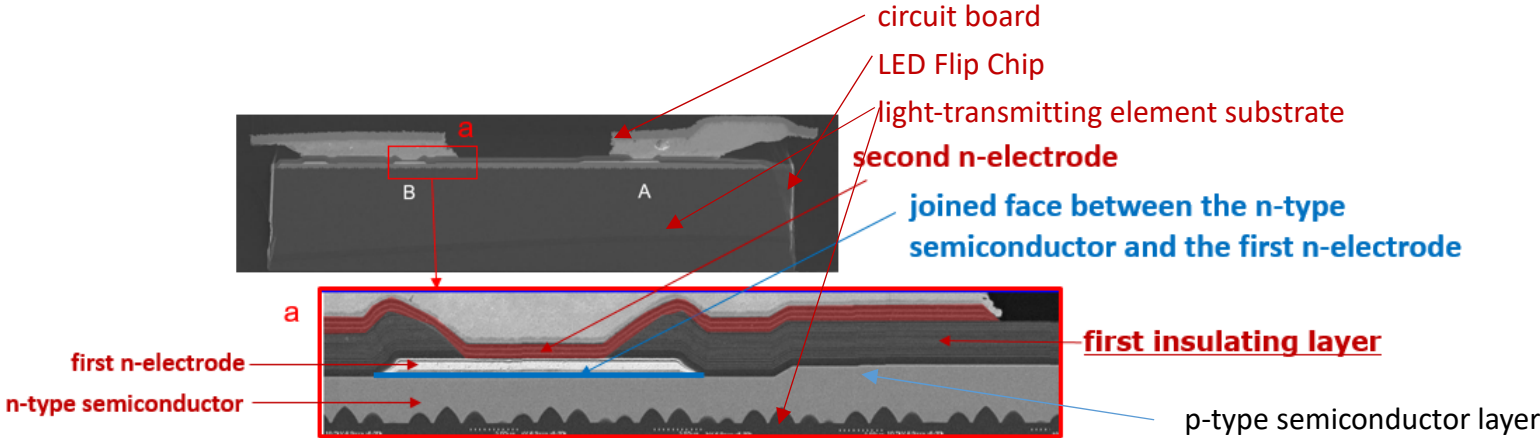
| Element | Weight% | Atomic% |
|---------|---------|---------|
| O K     | 55.10   | 72.41   |
| Si K    | 25.45   | 19.05   |
| Ti K    | 19.45   | 8.53    |
| Totals  | 100.00  |         |

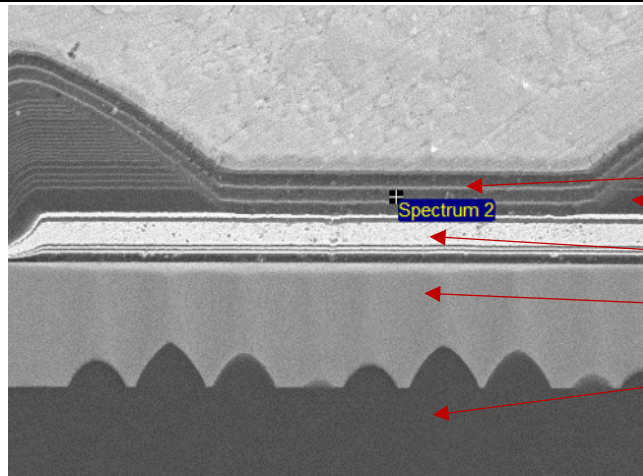


- first insulating layer
- first p-electrode
- p-type semiconductor layer
- n-type semiconductor layer
- light-transmitting element substrate

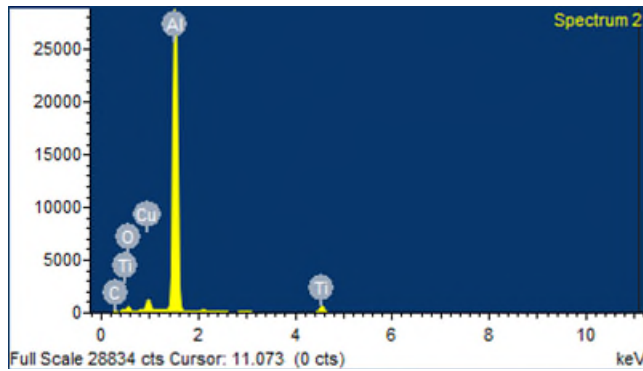


| Element | Weight% | Atomic% |
|---------|---------|---------|
| O K     | 54.48   | 73.02   |
| Si K    | 20.88   | 15.95   |
| Ti K    | 24.64   | 11.03   |
| Totals  | 100.00  |         |

|                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>9.3 forming a second n-electrode on the first n-electrode and the first insulating layer as a thin film having an area larger than a joined face between the n-type semiconductor and the first n-electrode, so that the second n-electrode is electrically connected to the first n-electrode and is insulated from the first p-electrode by the first insulating layer; and</p> | <p><b><u>The Accused Filament Product are made by a method that includes forming a second n-electrode on the first n-electrode and the first insulating layer.</u></b></p> <p>The LED Flip chip in the Accused Filament Product includes a second n-electrode (e.g., Al) formed on the first n-electrode and the first insulating layer as a thin film.</p> <p>In addition, the second n-electrode is electrically connected to the first n-electrode and being insulated from the first p-electrode by the first insulating layer.</p> <p>See, e.g., enlarged images of rectangular areas in the cross-sectional image of <b><u>ROLLSBO LED BULB E26 140 LUMEN</u></b>:</p>  <p>See, e.g., EDX Analysis of <b><u>the second n-electrode of ROLLSBO LED BULB E26 140 LUMEN</u></b>:<br/>Spectrum 2 (below panel) shows the second n-electrode (below panel) as obtained from SEM-EDX analysis. As shown in Spectrum 2 (below panel), the elements Aluminum (Al) and Titanium (Ti) are present in the second n-electrode (below panel).</p> |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

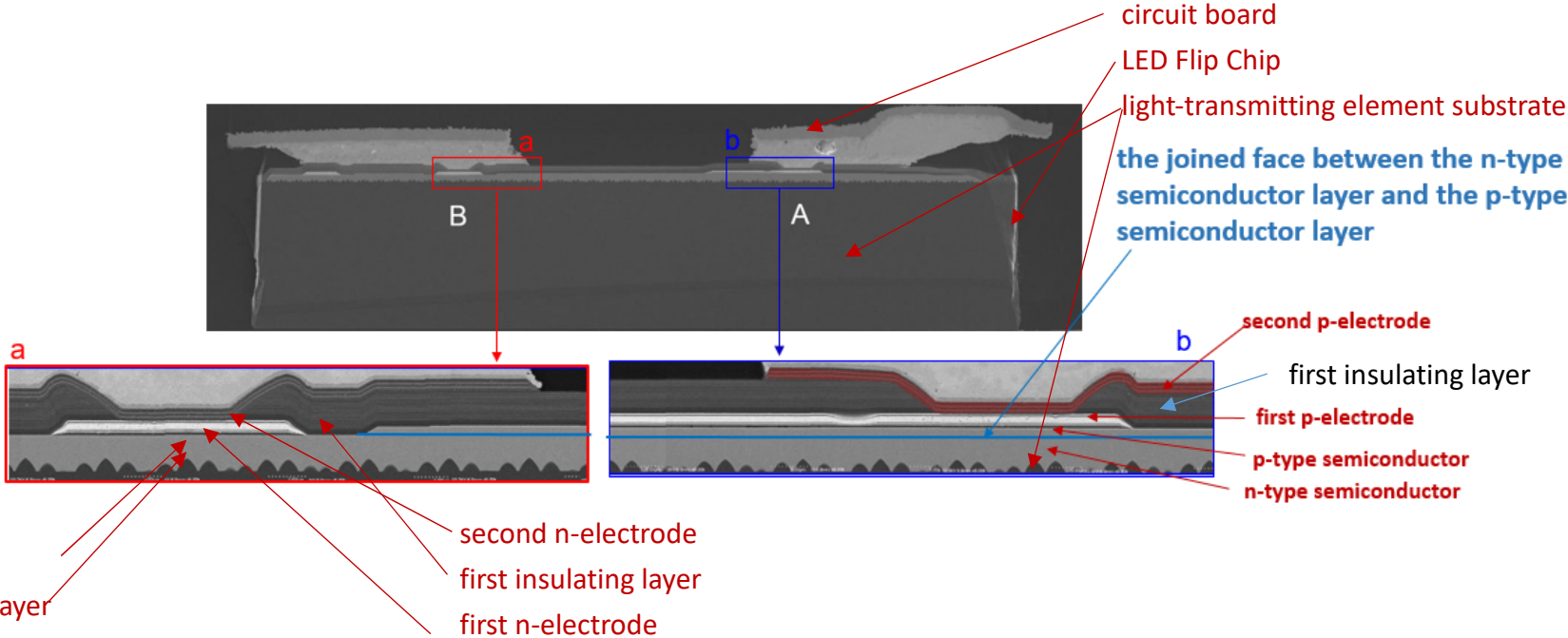


- second n-electrode
- first insulating layer
- first n-electrode
- n-type semiconductor layer
- light-transmitting element substrate

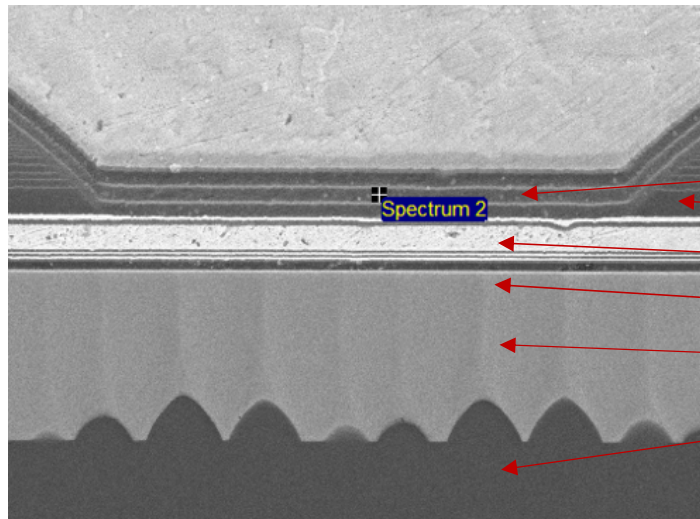


| Element | Weight% | Atomic% |
|---------|---------|---------|
| C K     | 4.30    | 9.80    |
| O K     | 3.44    | 5.88    |
| Al K    | 73.26   | 74.29   |
| Ti K    | 13.08   | 7.47    |
| Cu L    | 5.92    | 2.55    |
| Totals  | 100.00  |         |

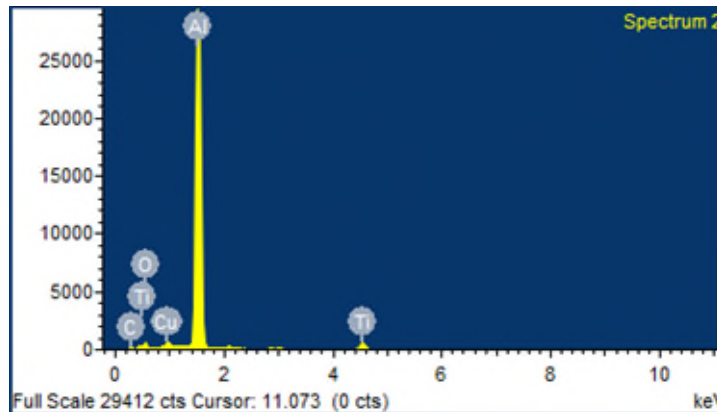
As shown below, the area of the second n-electrode is the **red area**, and the area of the joined face between the n-type semiconductor and the first n-electrode is the same as the area of the first n-electrode, which is the **blue area**; therefore, the area of the second n-electrode (**red area**) is larger than the area of the joined face between the n-type semiconductor and the first n-electrode (**blue area**).

|     |                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|     |                                                                                                                                                                                                                                                                                     | <p>an area of the second n-electrode &gt; an area of the joined face between the n-type semiconductor and the first n-electrode</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 9.4 | <p>forming a second p-electrode on the first p-electrode as a thin film having an area smaller than a joined face between the n-type semiconductor layer and the p-type semiconductor layer, so that the second p-electrode is electrically connected to the first p-electrode.</p> | <p><b><u>The Accused Filament Product are made by a method that includes forming a second p-electrode on the first p-electrode.</u></b></p> <p>The LED Flip chip in the Accused Filament Product includes a second p-electrode (e.g., Al) formed as a thin film, and the second p-electrode being electrically connected to the first p-electrode.</p> <p>See, e.g., enlarged images of rectangular areas in the cross-sectional image of <b><u>ROLLSBO LED BULB E26 140 LUMEN</u></b>:</p>  <p>n-type semiconductor layer<br/>p-type semiconductor layer<br/>second n-electrode<br/>first insulating layer<br/>first p-electrode<br/>second p-electrode<br/>first insulating layer<br/>first p-electrode<br/>p-type semiconductor<br/>n-type semiconductor<br/>circuit board<br/>LED Flip Chip<br/>light-transmitting element substrate<br/>the joined face between the n-type semiconductor layer and the p-type semiconductor layer</p> <p>See, e.g., EDX Analysis of <b><u>the second p-electrode of ROLLSBO LED BULB E26 140 LUMEN</u></b>:</p> |

Spectrum 2 (below panel) shows the second p-electrode (below panel) as obtained from SEM-EDX analysis. As shown in Spectrum 2 (below panel), the elements Aluminum (Al) and Titanium (Ti) are present in the second p-electrode (below panel).



- second p-electrode
- first insulating layer
- first p-electrode
- p-type semiconductor layer
- n-type semiconductor layer
- light-transmitting element substrate



| Element | Weight% | Atomic% |
|---------|---------|---------|
| C K     | 4.37    | 9.74    |
| O K     | 3.17    | 5.30    |
| Al K    | 77.63   | 77.01   |
| Ti K    | 12.33   | 6.89    |
| Cu L    | 2.50    | 1.05    |
| Totals  | 100.00  |         |

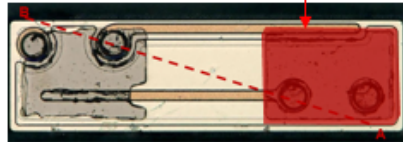
As shown below, the area of the second p-electrode is the red area, and the area of joined face between the n-type semiconductor layer and the p-type semiconductor layer is approximately the area outside of the first n-electrode, which is the blue area;

therefore, the area of the second p-electrode (red area) is smaller than the area of the joined face between the n-type semiconductor layer and the p-type semiconductor layer (blue area).

**an area of the second p-electrode**



**an area of the joined face between the n-type semiconductor layer and the p-type semiconductor layer**



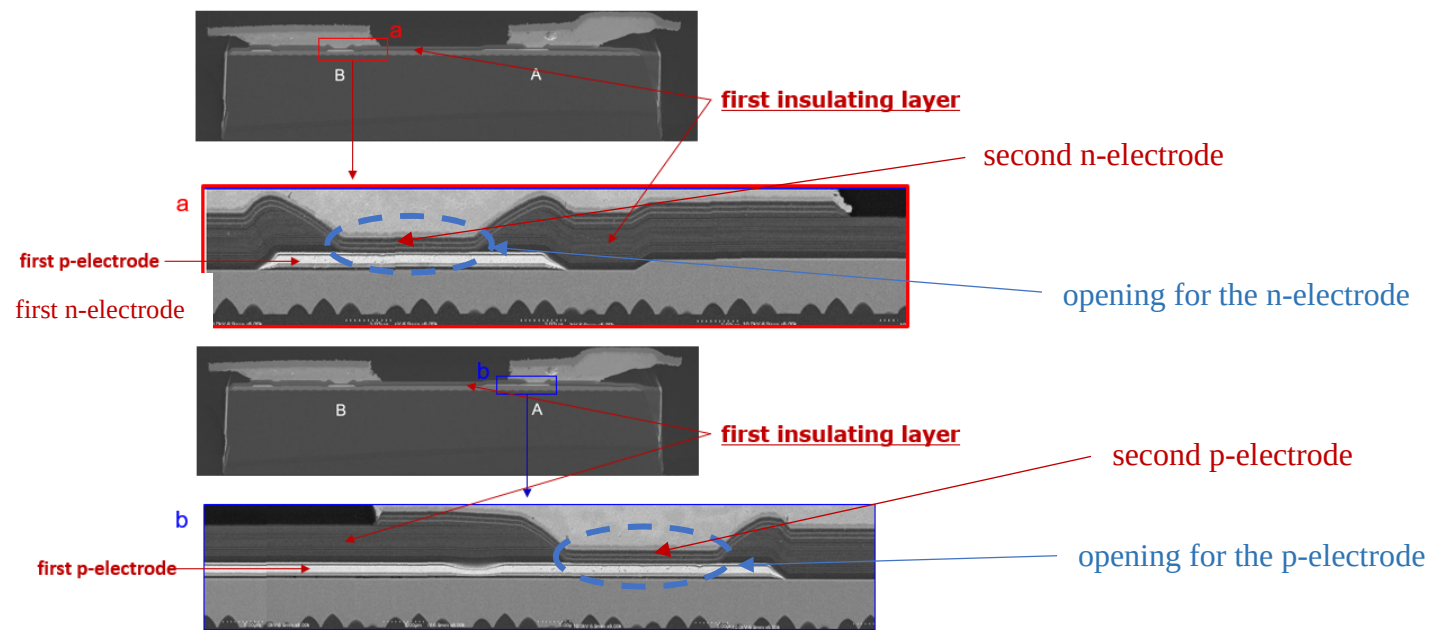
| '126 Claims Element |                                                                                                                                                                                                                                                                                                                                                                                                                                | Elements in Accused Filament Product |
|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Claim 10            |                                                                                                                                                                                                                                                                                                                                                                                                                                |                                      |
| 10.0<br>To<br>10.1  | <p>A method for manufacturing a semiconductor light-emitting element comprising:</p> <p>preparing a bare light-emitting element comprising an n-type semiconductor layer formed on a light-transmitting element substrate so as to cover the element substrate;</p> <p>a p-type semiconductor layer formed on an area on the n-type semiconductor layer from which an area for the n-electrode on the n-type semiconductor</p> | See claim element 9.0 to 9.1 above.  |

|                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| <p>layer is excluded, for emitting light in cooperation with the n-type semiconductor layer;</p> <p>a first n-electrode that is a thin film formed on the area for the n-electrode of the n-type semiconductor layer; and</p> <p>a first p-electrode that is a thin film formed on the p-type semiconductor layer; forming a first insulating layer so as to insulate the first n-electrode and the first p-electrode from each other;</p> |  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|

10.2 forming a first insulating layer having at least one of each of an opening for the n-electrode and an opening for the p-electrode so as to cover the first n-electrode and the first p-electrode;

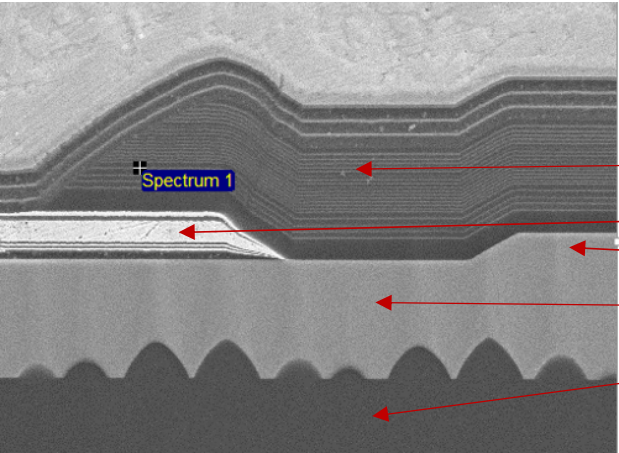
**The Accused Filament Product are made by a method that includes forming a first insulating layer having at least one of each of an opening for the n-electrode and an opening for the p-electrode.**

The LED Flip chip in the Accused Filament Product includes a first insulating layer (e.g., SiO<sub>x</sub> and TiO<sub>x</sub>) that is formed on the first n-electrode and the first p-electrode after preparing a bare light-emitting element and insulate them from each other. See, e.g., enlarged images of rectangular areas in the cross-sectional image of **ROLLSBO LED BULB E26 140 LUMEN**: The first insulating layer insulate the first n-electrode and the first p-electrode from each other, except for the opening for the n-electrode and the opening for the p-electrode; as shown in the figure below, the first insulating layer don't completely cover the first n-electrode and first p-electrode, and at least one opening for the first n-electrode and at least one opening for the first p-electrode are reserved, so that the first n-electrode can be electrically connected to second n-electrode through the opening for the p-electrode, and the first p-electrode can also be electrically connected to second p-electrode through the opening for the p-electrode.

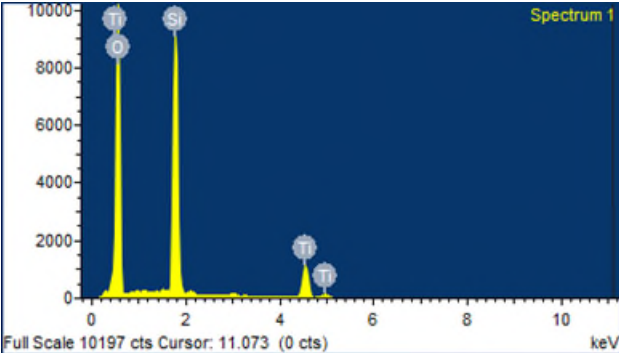


See, e.g., EDX Analysis of **the first insulating layer of ROLLSBO LED BULB E26 140 LUMEN:**

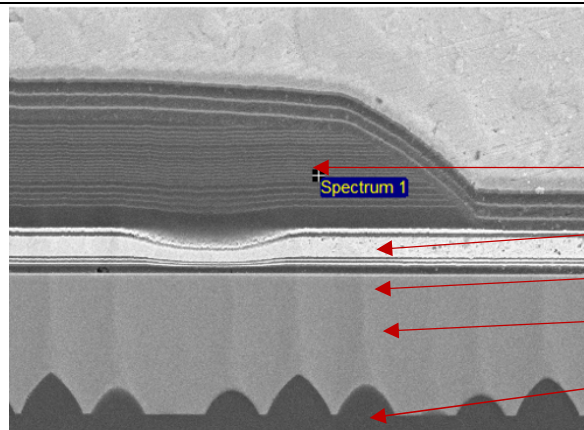
Spectrum 1 (below panel) shows the first insulating layer (below panel) as obtained from SEM-EDX analysis. As shown in Spectrum 1 (below panel), the elements Silicon (Si), Titanium (Ti) and Oxygen are present in the first insulating layer (below panel), which is consistent with the LED Flip Chip comprising Silicon Oxide (SiO<sub>x</sub>) and Titanium Oxide(TiO<sub>x</sub>).



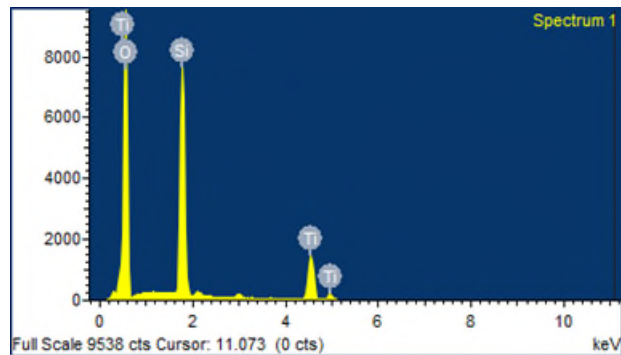
first insulating layer  
first n-electrode  
p-type semiconductor layer  
n-type semiconductor layer  
light-transmitting element substrate



| Element | Weight% | Atomic% |
|---------|---------|---------|
|         |         |         |
| O K     | 55.10   | 72.41   |
| Si K    | 25.45   | 19.05   |
| Ti K    | 19.45   | 8.53    |
|         |         |         |
| Totals  | 100.00  |         |

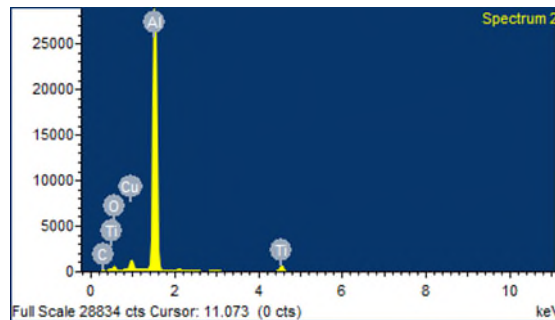
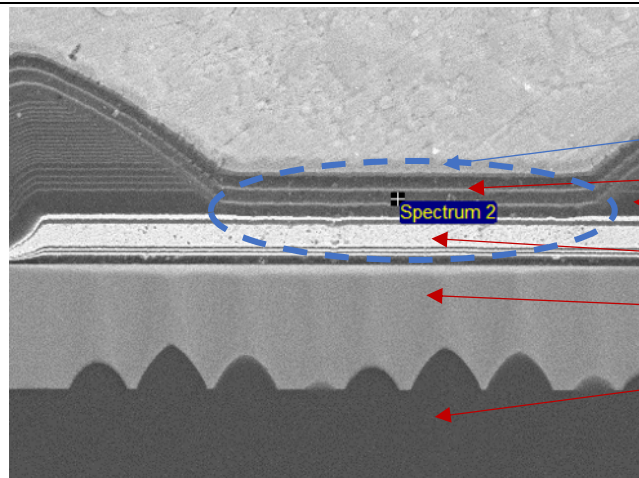


- first insulating layer
- first p-electrode
- p-type semiconductor layer
- n-type semiconductor layer
- light-transmitting element substrate



| Element | Weight% | Atomic% |
|---------|---------|---------|
| O K     | 54.48   | 73.02   |
| Si K    | 20.88   | 15.95   |
| Ti K    | 24.64   | 11.03   |
| Totals  | 100.00  |         |

|      |                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 10.3 | <p>forming, on the first insulating layer, a second n-electrode that is a thin film having an area larger than a joined face between the n-type semiconductor layer and the first n-electrode, so that the second n-electrode is electrically connected to the first n-electrode through the opening for the n-electrode of the first insulating layer; and</p> | <p><b><u>The Accused Filament Product are made by a method that includes forming, on the first insulating layer, a second n-electrode.</u></b></p> <p>The LED Flip chip in the Accused Filament Product includes a second n-electrode (e.g., Al) formed on the first n-electrode and the first insulating layer as a thin film.</p> <p>In addition, the second n-electrode is electrically connected to the first n-electrode through the opening for the n-electrode of the first insulating layer, and being insulated from the first p-electrode by the first insulating layer.</p> <p>See, e.g., enlarged images of rectangular areas in the cross-sectional image of <b><u>ROLLSBO LED BULB E26 140 LUMEN</u></b>:</p> <div data-bbox="512 472 2101 815" data-label="Image"> </div> <p>See, e.g., EDX Analysis of <b><u>the second n-electrode of ROLLSBO LED BULB E26 140 LUMEN</u></b>:<br/>Spectrum 2 (below panel) shows the second n-electrode (below panel) as obtained from SEM-EDX analysis. As shown in Spectrum 2 (below panel), the elements Aluminum (Al) and Titanium (Ti) are present in the second n-electrode (below panel).</p> |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|



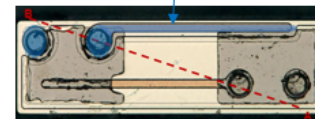
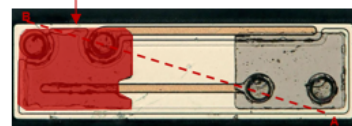
| Element | Weight% | Atomic% |
|---------|---------|---------|
| C K     | 4.30    | 9.80    |
| O K     | 3.44    | 5.88    |
| Al K    | 73.26   | 74.29   |
| Ti K    | 13.08   | 7.47    |
| Cu L    | 5.92    | 2.55    |
| Totals  | 100.00  |         |

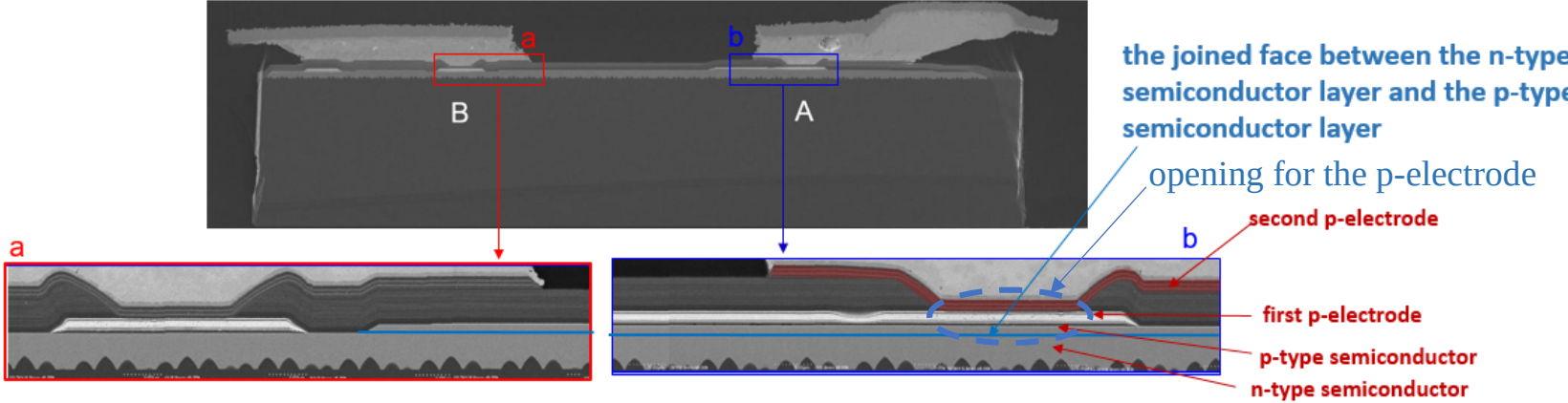
As shown below, the area of the second n-electrode is the **red area**, and the area of the joined face between the n-type semiconductor and the first n-electrode is the same as the area of the first n-electrode, which is the **blue area**; therefore, the area of the second n-electrode (**red area**) is larger than the area of the joined face between the n-type semiconductor and the first n-electrode (**blue area**).

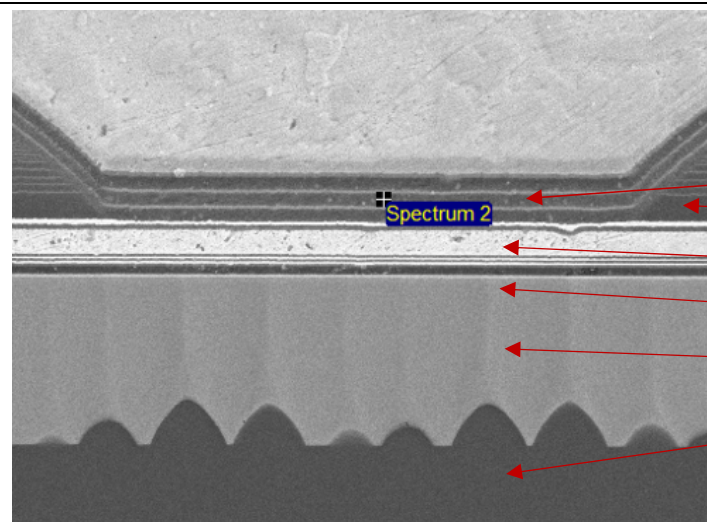
**an area of the second n-electrode**



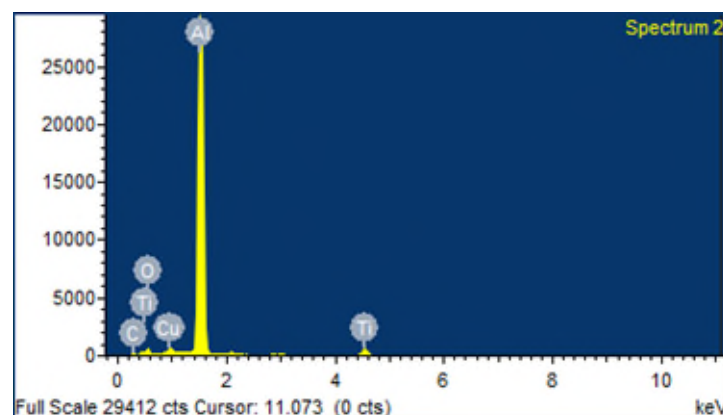
**an area of the joined face between the n-type semiconductor and the first n-electrode**



|      |                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 10.4 | <p>forming, on the first insulating layer, a second p-electrode that is a thin film having an area smaller than a joined face between the n-type semiconductor layer and the p-type semiconductor layer, so that the second p-electrode is electrically connected to the first p-electrode through the opening for the p-electrode of the first insulating layer.</p> | <p><b><u>The Accused Filament Product are made by a method that includes forming, on the first insulating layer, a second p-electrode.</u></b></p> <p>The LED Flip chip in the Accused Filament Product includes a second p-electrode (e.g., Al) formed on the first insulating layer as a thin film, and the second p-electrode being electrically connected to the first p-electrode through the opening for the p-electrode of the first insulating layer.</p> <p>See, e.g., enlarged images of rectangular areas in the cross-sectional image of <b><u>ROLLSBO LED BULB E26 140 LUMEN</u></b>:</p>  <p>The image shows a cross-sectional view of a LED chip. The top panel is a grayscale SEM image with two rectangular regions labeled 'a' and 'b' highlighted in red and blue boxes respectively. Below this, two enlarged EDX spectra are shown. The left spectrum, labeled 'a' in red, corresponds to region 'a' and shows a prominent peak for Aluminum (Al). The right spectrum, labeled 'b' in blue, corresponds to region 'b' and shows peaks for Aluminum (Al) and Titanium (Ti). To the right of the spectra, a color-coded cross-section of the chip is shown with labels: 'the joined face between the n-type semiconductor layer and the p-type semiconductor layer' (blue), 'opening for the p-electrode' (blue), 'second p-electrode' (red), 'first p-electrode' (red), 'p-type semiconductor' (red), and 'n-type semiconductor' (red).</p> <p>See, e.g., EDX Analysis of <b><u>the second p-electrode of ROLLSBO LED BULB E26 140 LUMEN</u></b>:<br/>Spectrum 2 (below panel) shows the second p-electrode (below panel) as obtained from SEM-EDX analysis. As shown in Spectrum 2 (below panel), the elements Aluminum (Al) and Titanium (Ti) are present in the second p-electrode (below panel).</p> |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

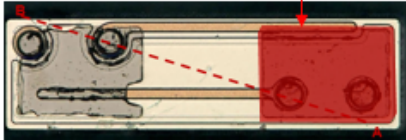


second p-electrode  
 first insulating layer  
 first p-electrode  
 p-type semiconductor layer  
 n-type semiconductor layer  
 light-transmitting element substrate



| Element | Weight% | Atomic% |
|---------|---------|---------|
| C K     | 4.37    | 9.74    |
| O K     | 3.17    | 5.30    |
| Al K    | 77.63   | 77.01   |
| Ti K    | 12.33   | 6.89    |
| Cu L    | 2.50    | 1.05    |
| Totals  | 100.00  |         |

As shown below, the area of the second p-electrode is the red area, and the area of joined face between the n-type semiconductor layer and the p-type semiconductor layer is approximately the area outside of the first n-electrode, which is the blue area; therefore, the area of the second p-electrode (red area) is smaller than the area of the joined face between the n-type semiconductor layer and the p-type semiconductor layer (blue area).

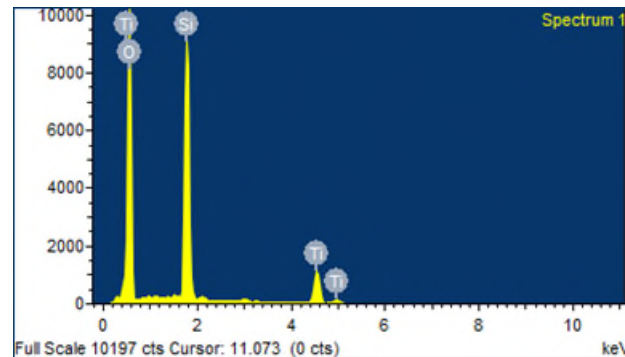
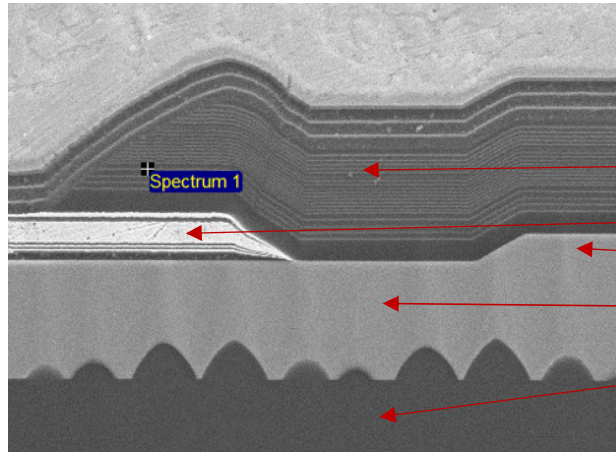
|  |  |                                                                                                                                  |                                                                                                                                                                                                 |
|--|--|----------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  |  | <p>an area of the second p-electrode &lt;</p>  | <p>an area of the joined face between the n-type semiconductor layer and the p-type semiconductor layer</p>  |
|--|--|----------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

| '126 Claims Element                                                                                                                                                     | Elements in Accused Filament Product                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Claim 11</b>                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <p>11.1 The method for manufacturing a semiconductor light-emitting element according to claim 10, wherein the first insulating layer is formed through sputtering.</p> | <p>The LED Flip chip in the Accused Filament Product includes a first insulating layer (e.g., SiO<sub>x</sub> and TiO<sub>x</sub>) that is formed on the first n-electrode and the first p-electrode after preparing a bare light-emitting element and insulate them from each other. The first insulating layer is formed through sputtering, and Sputtering is commonly applied to the formation of electrode films or insulating layer in the technical field of light-emitting diode manufacturing.</p> <p>See, e.g., enlarged images of rectangular areas in the cross-sectional image of <b>ROLLSBO LED BULB E26 140 LUMEN</b>:</p> <p>The images illustrate the structure of the LED Flip chip. The top image shows the chip mounted on a circuit board, with a light-transmitting element substrate and a first insulating layer. The second image (a) is an enlargement of area 'a' showing the first n-electrode, n-type semiconductor layer, p-type semiconductor layer, and first insulating layer. The third image shows area 'b' with labels for circuit board, LED Flip Chip, light-transmitting element substrate, and first insulating layer. The fourth image (b) is an enlargement of area 'b' showing the first p-electrode, p-type semiconductor layer, and n-type semiconductor layer.</p> |

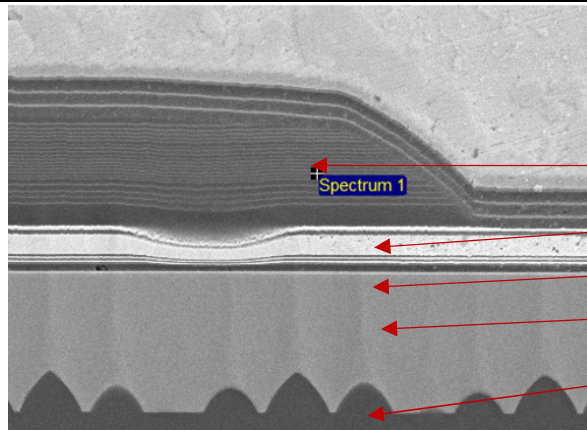
See, e.g., EDX Analysis of **the first insulating layer of ROLLSBO LED BULB E26 140 LUMEN:**

Spectrum 1 (below panel) shows the first insulating layer (below panel) as obtained from SEM-EDX analysis. As shown in Spectrum 1 (below panel), the elements Silicon (Si), Titanium (Ti) and Oxygen are present in the first insulating layer (below panel), which is consistent with the LED Flip Chip comprising Silicon Oxide ( $\text{SiO}_x$ ) and Titanium Oxide( $\text{TiO}_x$ ).

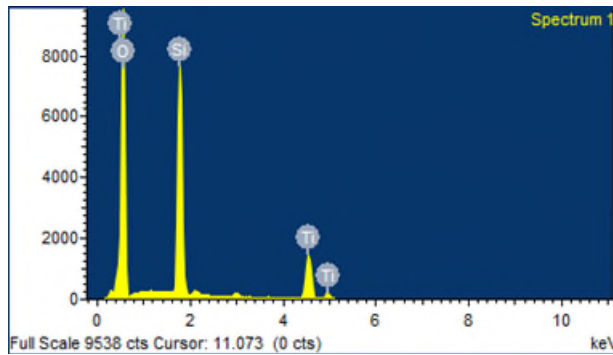
In addition, the first insulating layer, which is composed of Silicon Oxide ( $\text{SiO}_x$ ) and Titanium Oxide( $\text{TiO}_x$ ), are deposited on the first n-electrode, first p-electrode and semiconductor layers by sputtering.



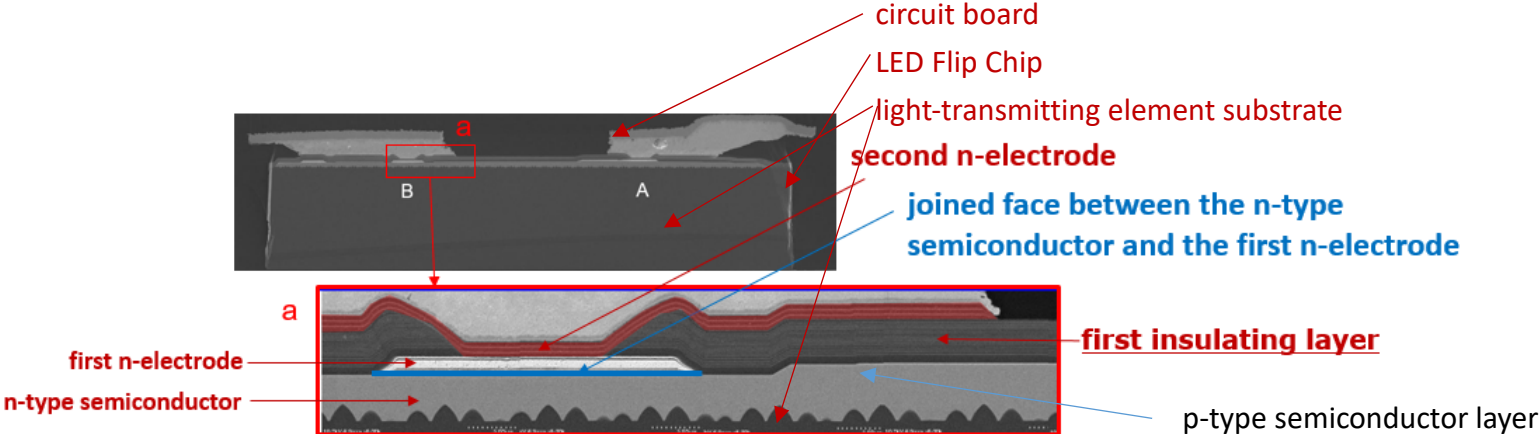
| Element | Weight% | Atomic% |
|---------|---------|---------|
| O K     | 55.10   | 72.41   |
| Si K    | 25.45   | 19.05   |
| Ti K    | 19.45   | 8.53    |
| Totals  | 100.00  |         |

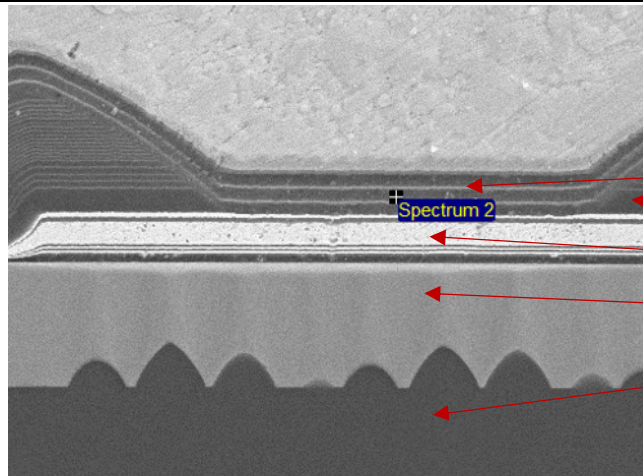


- first insulating layer
- first p-electrode
- p-type semiconductor layer
- n-type semiconductor layer
- light-transmitting element substrate

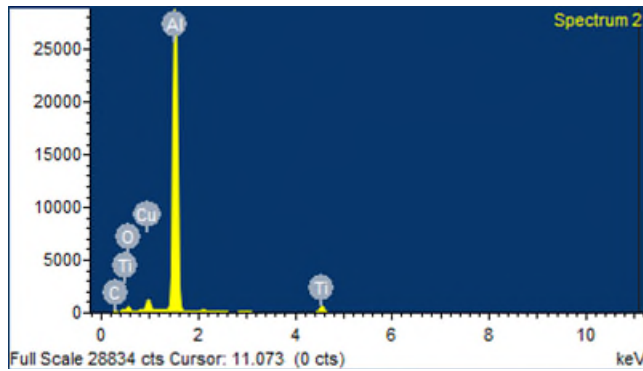


| Element | Weight% | Atomic% |
|---------|---------|---------|
| O K     | 54.48   | 73.02   |
| Si K    | 20.88   | 15.95   |
| Ti K    | 24.64   | 11.03   |
| Totals  | 100.00  |         |

| '126 Claims Element                                                                                                                                                                                       | Elements in Accused Filament Product                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Claim 12</b>                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <p>12.1 The method for manufacturing a semiconductor light-emitting element according to claim 9, wherein the second n-electrode and the second p-electrode are formed through sputtering or plating.</p> | <p>The LED Flip chip in the Accused Filament Product includes a second n-electrode and a second p-electrode that are formed through sputtering or plating.</p> <p>The LED Flip chip in the Accused Filament Product includes a second n-electrode and a second p-electrode (e.g., Al) formed as a thin film, and sputtering or plating is commonly applied to the formation of electrode films in the technical field of light-emitting diode manufacturing; furthermore, Sputtering can deposit metal/non-metal atoms or molecules on the surface of the object, and plating can deposit metal on the surface of the conductor.</p> <p>See, e.g., enlarged images of rectangular areas in the cross-sectional image of <b><u>ROLLSBO LED BULB E26 140 LUMEN</u></b>:</p>  <p>See, e.g., EDX Analysis of <b><u>the second n-electrode of ROLLSBO LED BULB E26 140 LUMEN</u></b>:<br/>Spectrum 2 (below panel) shows the second n-electrode (below panel) as obtained from SEM-EDX analysis. As shown in Spectrum 2 (below panel), the elements Aluminum (Al) and Titanium (Ti) are present in the second n-electrode (below panel).</p> |

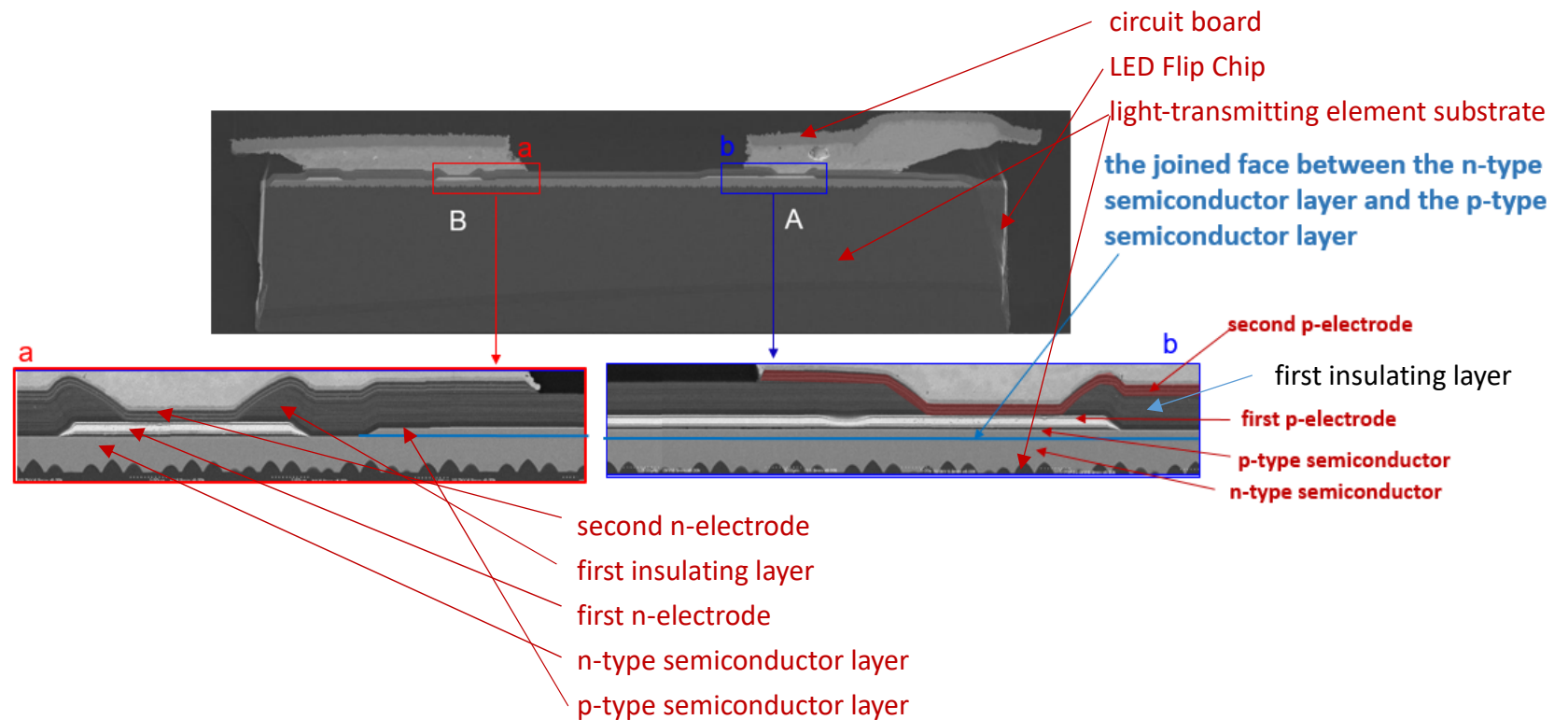


- second n-electrode
- first insulating layer
- first n-electrode
- n-type semiconductor layer
- light-transmitting element substrate



| Element | Weight% | Atomic% |
|---------|---------|---------|
| C K     | 4.30    | 9.80    |
| O K     | 3.44    | 5.88    |
| Al K    | 73.26   | 74.29   |
| Ti K    | 13.08   | 7.47    |
| Cu L    | 5.92    | 2.55    |
| Totals  | 100.00  |         |

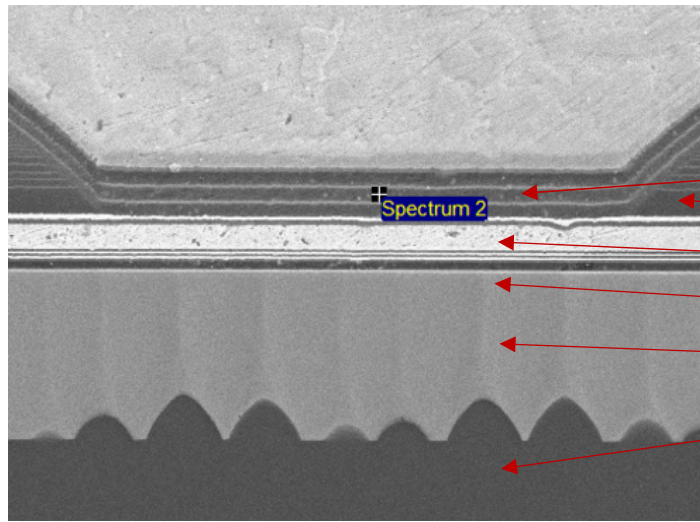
See, e.g., enlarged images of rectangular areas in the cross-sectional image of **ROLLSBO LED BULB E26 140 LUMEN:**



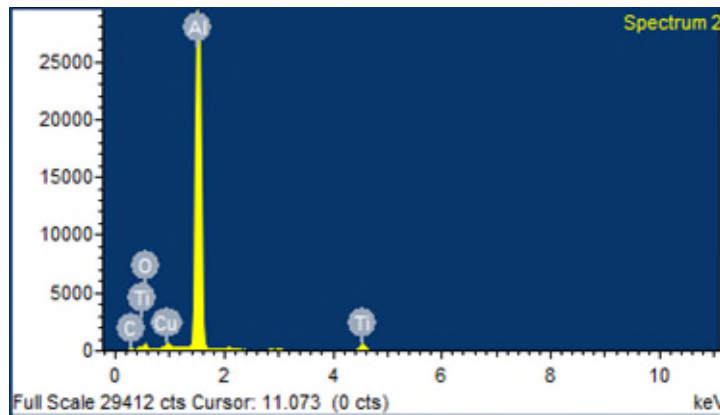
See, e.g., EDX Analysis of **the second p-electrode of ROLLSBO LED BULB E26 140 LUMEN:**

See, e.g., EDX Analysis of **the second p-electrode of ROLLSBO LED BULB E26 140 LUMEN:**

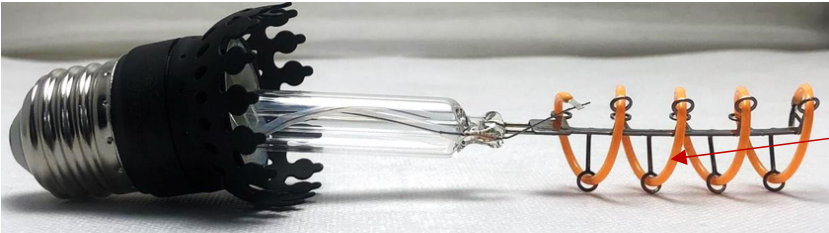
Spectrum 2 (below panel) shows the second p-electrode (below panel) as obtained from SEM-EDX analysis. As shown in Spectrum 2 (below panel), the elements Aluminum (Al) and Titanium (Ti) are present in the second p-electrode (below panel).

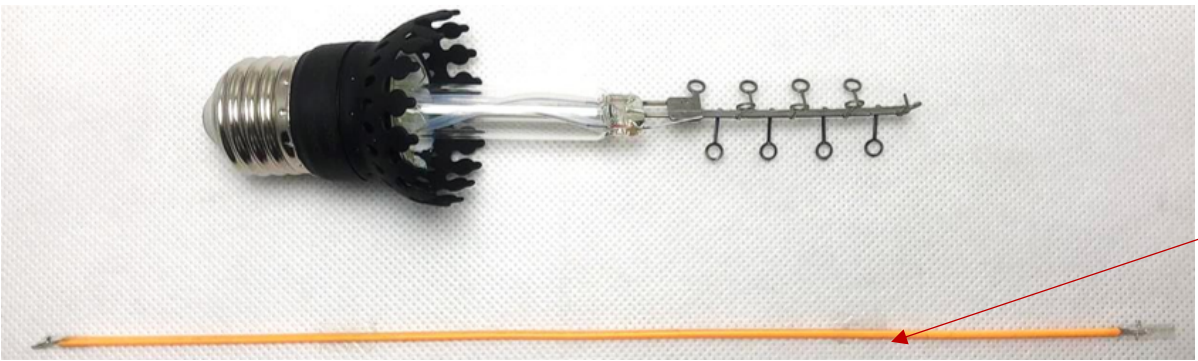


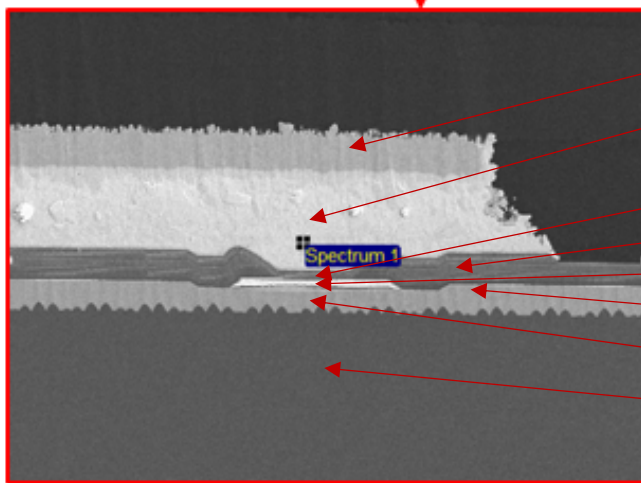
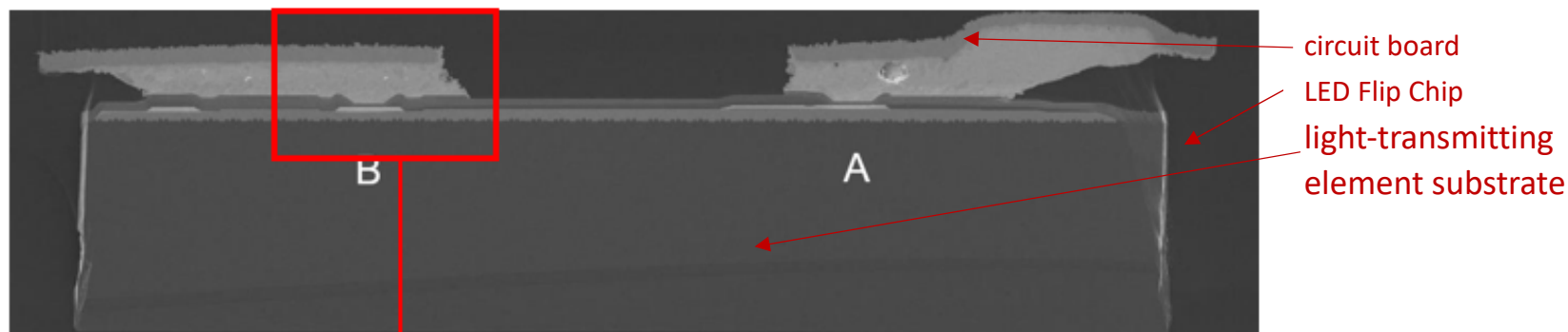
second p-electrode  
 first insulating layer  
 first p-electrode  
 p-type semiconductor layer  
 n-type semiconductor layer  
 light-transmitting element substrate



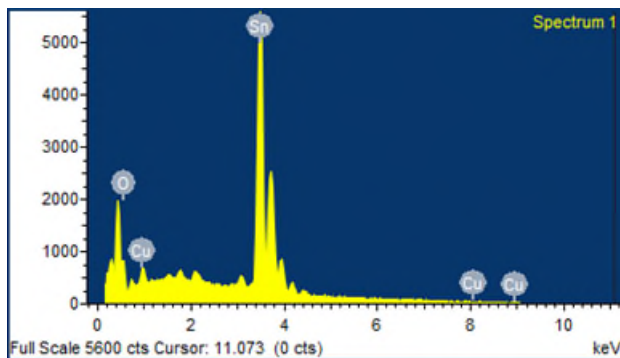
| Element | Weight% | Atomic% |
|---------|---------|---------|
| C K     | 4.37    | 9.74    |
| O K     | 3.17    | 5.30    |
| Al K    | 77.63   | 77.01   |
| Ti K    | 12.33   | 6.89    |
| Cu L    | 2.50    | 1.05    |
| Totals  | 100.00  |         |

| '126 Claims Element |                                                                          | Elements in Accused Filament Product                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|---------------------|--------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Claim 13            |                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 13.0                | A method for mounting semiconductor light-emitting elements, comprising: | <p>The Accused Filament Product are light-emitting devices and the LED Flip Chips mounted on the circuit board in the Accused Filament Product are semiconductor light-emitting elements.</p> <p>The Method of mounting the LED Flip Chips is a method for mounting semiconductor light-emitting elements.</p> <p>See, for example:</p> <p><b><u>ROLLSBO LED BULB E26 140 LUMEN:</u></b></p> <div data-bbox="463 505 1433 753"></div> <p>The filament within in the Accused Filament Product includes the circuit boards and the LED Flip Chips that are surrounding by yellow sealing members.</p> <div data-bbox="459 876 1630 1109">Filament</div> |

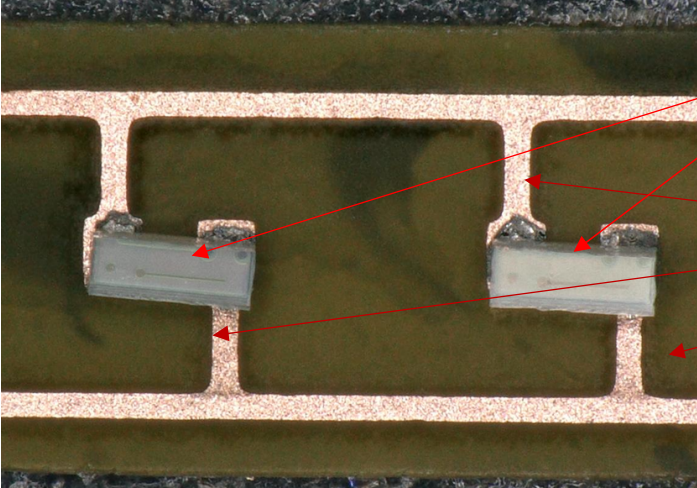
|      |                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|      |                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 13.1 | <p>placing solder between the second n-electrode as well as the second p-electrode of the semiconductor light-emitting element according to claim 1 and a plurality of electrodes on a circuit board,</p> | <p><b><u>The Accused Filament Product are made by a method that includes placing solder between the second n-electrode as well as the second p-electrode of the semiconductor light-emitting element and a plurality of electrodes on a circuit board.</u></b></p> <p>The Accused Filament Product include the conductive bonding material layer (e.g., a Solder/Sn substrate) between the second n-electrode/the second p-electrode and the electrodes on the circuit board, and electrically connects and fixes the second n-electrode and the second p-electrode to the electrodes on the circuit board.</p> <p>See, e.g., EDX Analysis of <b><u>the second p-electrode of ROLLSBO LED BULB E26 140 LUMEN:</u></b></p> <p>Spectrum 1 (below panel) shows the conductive bonding material layer (below panel) as obtained from SEM-EDX analysis. As shown in Spectrum 1 (below panel), the elements Tin (Sn) are present in the conductive bonding material layer (below panel), which is consistent with the conductive bonding material layer (e.g., a Solder/Sn substrate) electrically connecting and fixing the second n-electrode and the second p-electrode to the electrodes on the circuit board.</p> |

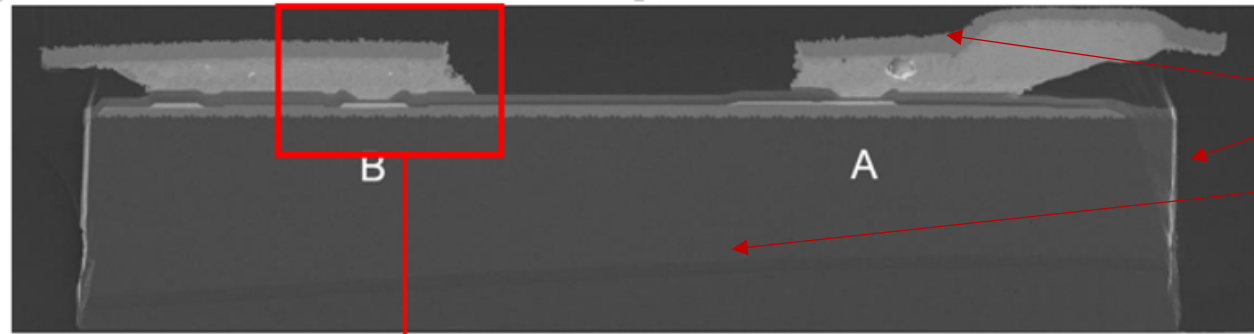


- a plurality of electrodes of the circuit board
- the conductive bonding material layer (e.g., a Solder/Sn substrate)
- second n-electrode
- first insulating layer
- first n-electrode
- p-type semiconductor layer
- n-type semiconductor layer
- light-transmitting element substrate

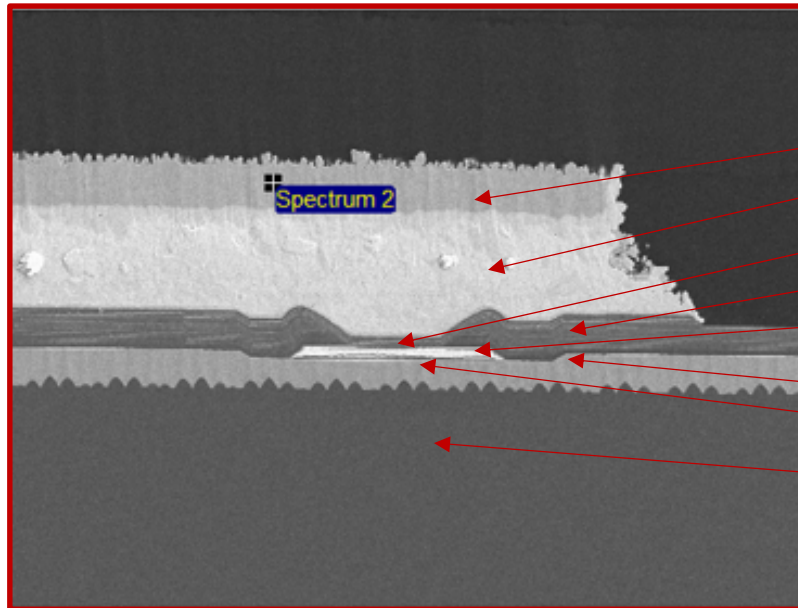


| Element | Weight% | Atomic% |
|---------|---------|---------|
| O K     | 4.77    | 26.61   |
| Cu L    | 2.71    | 3.80    |
| Sn L    | 92.53   | 69.59   |
| Totals  | 100.00  |         |

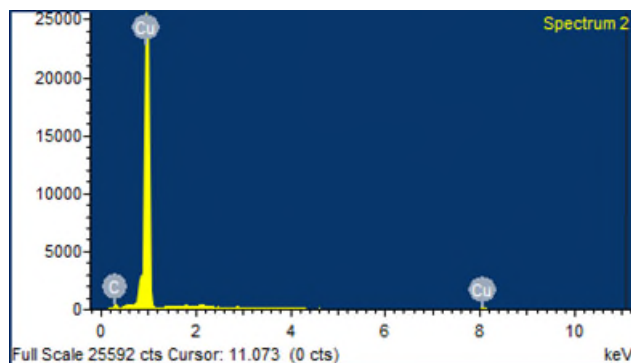
|      |                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|------|----------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 13.2 | <p>carrying out a reflow treatment thereon, thereby the semiconductor light-emitting elements are mounted on the circuit board through solder.</p> | <p>The Accused Filament Product include a circuit board having a plurality of electrodes, and the LED Flip Chips are mounted on the circuit board through solder.</p> <p>In order to mount the LED Flip Chips on the circuit board, the reflow process must be used to melt the solder and then fix the second n-/p-electrodes of the LED Flip Chips and the electrodes of the circuit board.</p> <div data-bbox="459 311 1153 801">  </div> <div data-bbox="1305 359 2009 614"> <p>LED Flip Chips (semiconductor light-emitting elements)</p> <p>a plurality of electrodes of the circuit board</p> <p>circuit board</p> </div> <p>See, e.g., EDX Analysis of <b><u>the second p-electrode of ROLLSBO LED BULB E26 140 LUMEN:</u></b></p> <p>Spectrum 2 (below panel) shows the electrodes of the circuit board (below panel) as obtained from SEM-EDX analysis. As shown in Spectrum 2 (below panel), the elements Copper (Cu) are present in the electrodes of the circuit board (below panel), which is consistent with the the circuit board having a plurality of electrodes.</p> |
|------|----------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|



circuit board  
LED Flip Chip  
light-transmitting  
element substrate

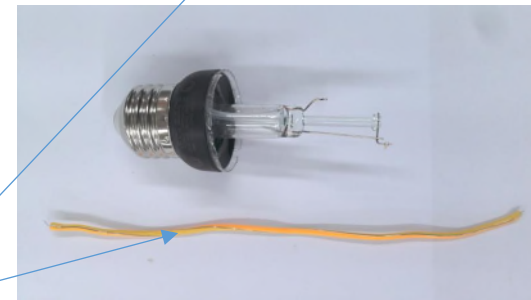
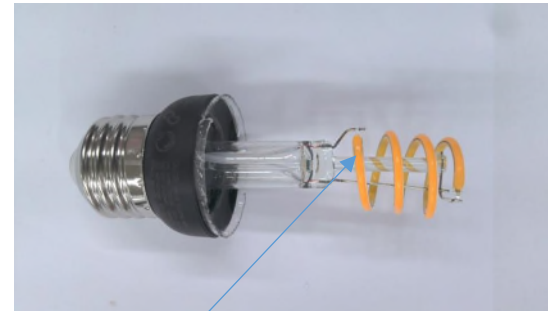


a plurality of electrodes of the circuit board  
the conductive bonding material layer  
second n-electrode  
first insulating layer  
first n-electrode  
p-type semiconductor layer  
n-type semiconductor layer  
light-transmitting element substrate

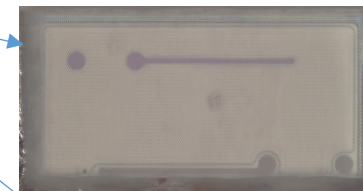


| Element | Weight% | Atomic% |
|---------|---------|---------|
| C K     | 4.90    | 21.43   |
| Cu L    | 95.10   | 78.57   |
| Totals  | 100.00  |         |

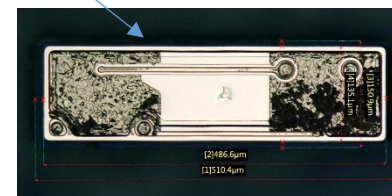
**Infringement of Claims 1-2 and 4-13 of US 7,554,126 by IKEA TRÅDFRI LED BULB E26 250 LUMEN, SMART WIRELESS DIMMABLE/WARM WHITE GLOBE**



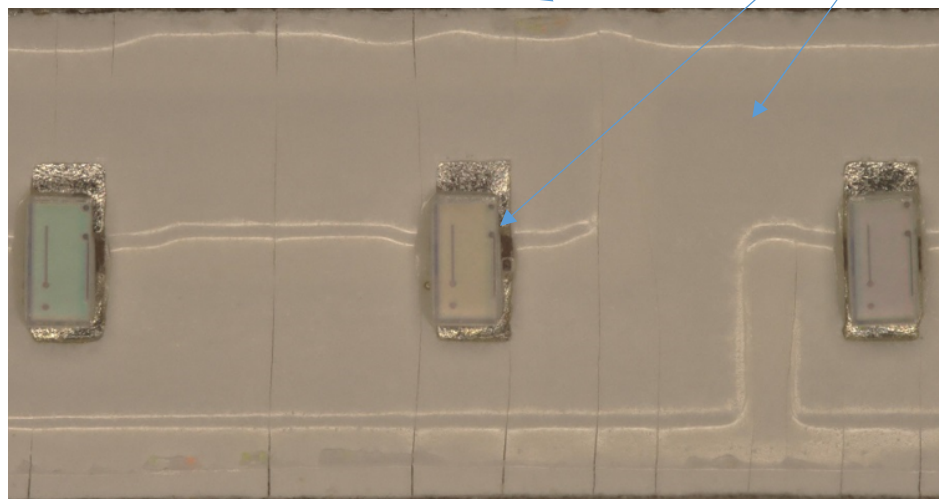
Filament  
LED Chip  
Circuit Board



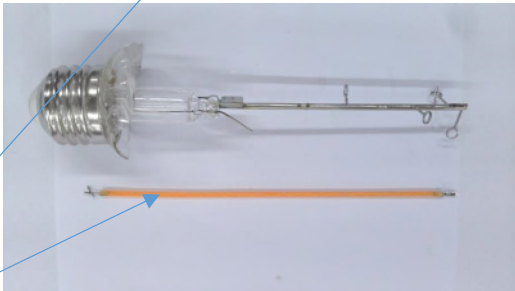
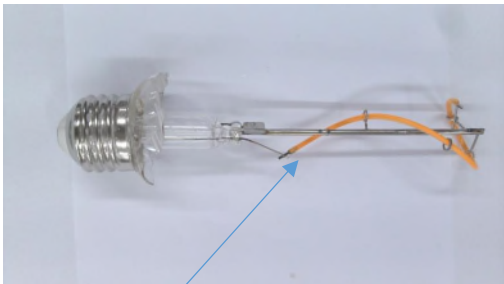
Top View



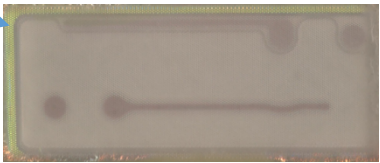
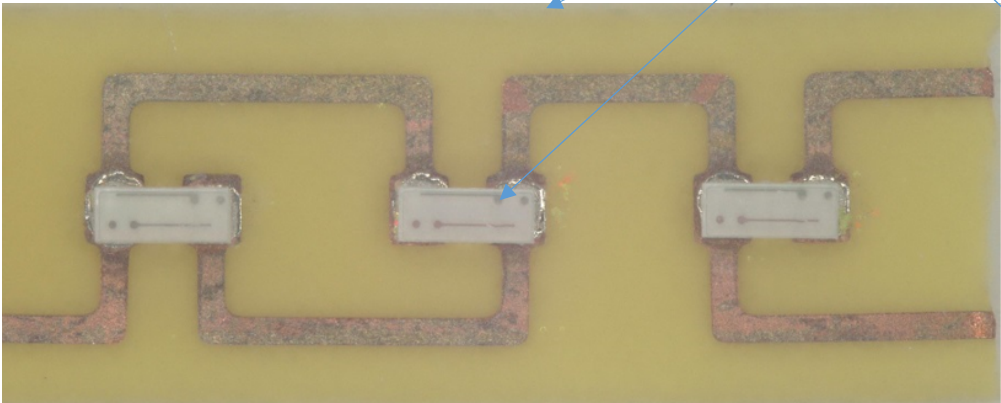
Bottom View



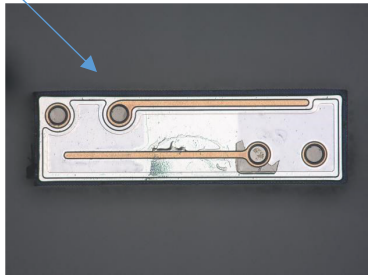
Infringement of Claims 1-2 and 4-13 of US 7,554,126 by IKEA MOLNARTLED BULB E26 260 LUMEN, ELLIPSE SHAPED MULTICOLOR, 6 "



Filament  
LED Chip  
Circuit Board

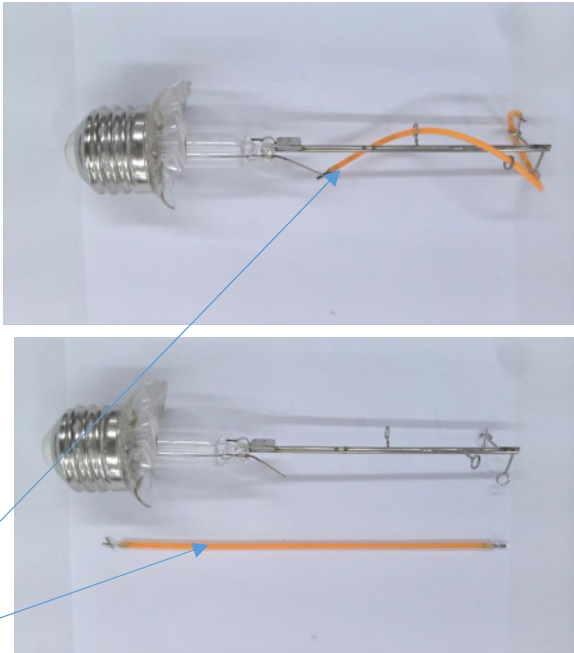


Top View



Bottom View

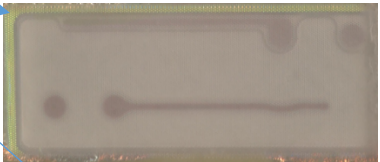
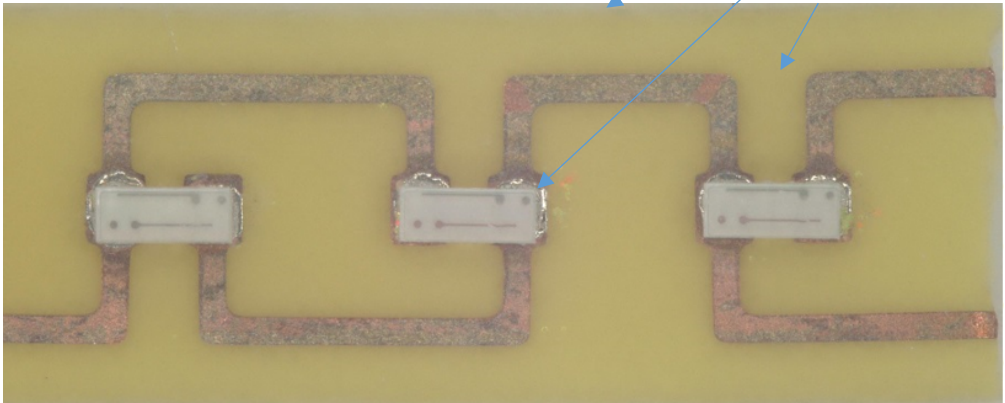
Infringement of Claims 1-2 and 4-13 of US 7,554,126 by IKEA MOLNART LED BULB E26 140 LUMEN, GLOBE GRAY CLEAR GLASS, 5 "



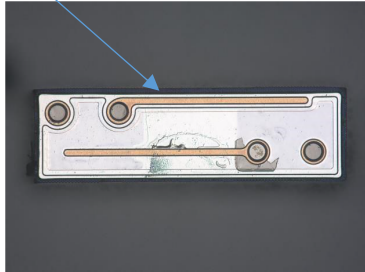
Filament

LED Chip

Circuit Board

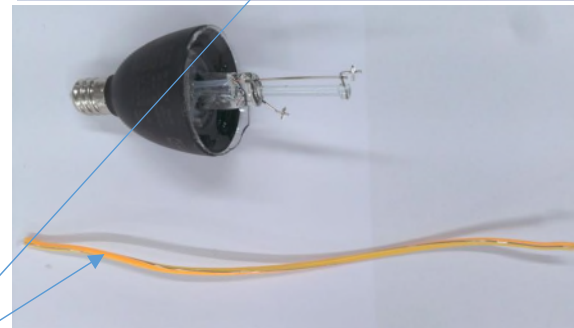
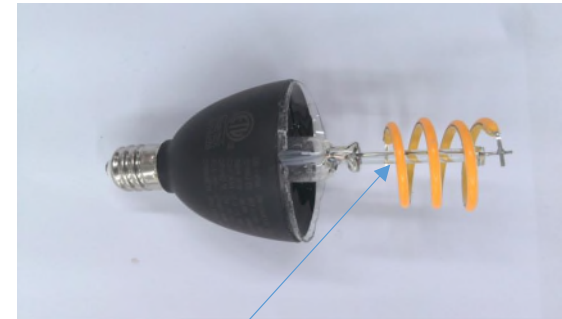


Top View

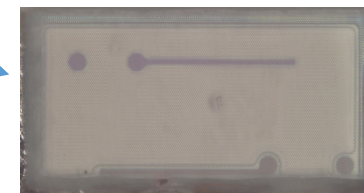
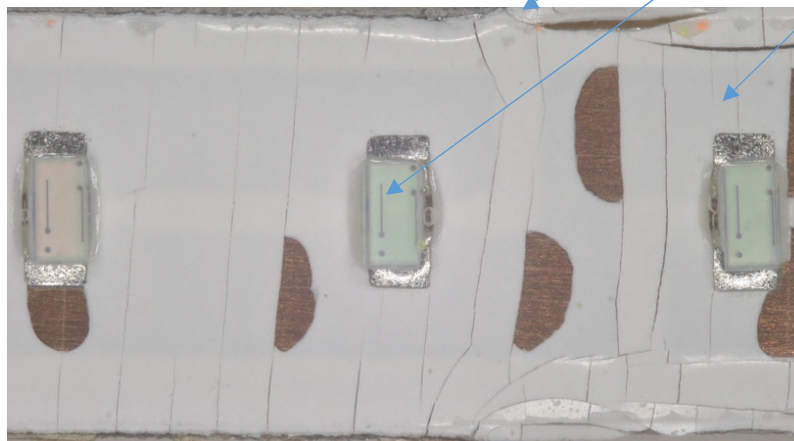


Bottom View

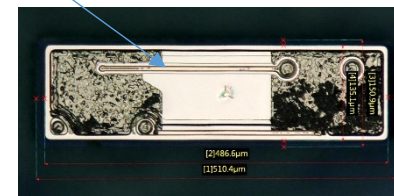
**Infringement of Claims 1-2 and 4-13 of US 7,554,126 by IKEA TRÅDFRI LED BULB E12 250 LUMEN, SMART WIRELESS DIMMABLE/WARM WHITE CHANDELIER**



Filament  
LED Chip  
Circuit Board



Top View



Bottom View