

TRANSLATION CERTIFICATION

Date: 2025/08/09

To whom it may concern:

This is to certify that the attached translation is an accurate representation of the documents received by this office. The translation was completed from:

- German (Germany)

To:

- English (USA)

The documents are designated as:

- 'Samsung ._. Pictiva _ DE391 _ LG München I _ 21 O 2603_24 (ehemals 21 O 13746_23) _ Klageerweiterung vom 07.03.2024.pdf'

Samuel Wu, Managing Director of this company, attests to the following:

"To the best of my knowledge, the aforementioned documents are a true, full and accurate translation of the specified documents."



Signature of **Samuel Wu**, Managing Director

Via beA [special electronic mailbox for attorneys]			
Received A&O MUC		03/07/2024	
Initials sw	For the attention of:	Client	Reminder

Peterreins Schley • Hermann-Sack-Straße 3 • 80331 Munich

PETERREINS SCHLEY

PATENT AND TRADEMARK ATTORNEYS



Regional Court of Munich I
– 21st Civil Chamber –
Lenbachplatz 7

80333 Munich

Via beA [special electronic mailbox for attorneys]

(beA correspondence requested to Attorney Dr. Thomas Adam)

Contains **color** illustrations

**The undersigned assumes personal liability
for court costs based on a preliminary estimated amount in dispute**

21 O 13746/23

Hearing date: December 18, 2024

Munich, March 7, 2024

Our reference: 51112-0002LL1

Statement of Extension of Claim

by **Pictiva Displays International Ltd.**, The Glasshouses GH2, 92
Georges Street Lower, Dun Laoghaire, Dublin,
Ireland, A96 VR66, represented by the
Managing Director Angela Quinlan, *same
address*

– **Plaintiff** –

Legal counsel:

The attorneys of Peterreins Schley Patent- und
Rechtsanwälte PartG mbB, lead counsel Dr.
Thomas Adam, with the involvement of the
patent attorneys of the firm, in particular Patent
Attorney Dipl.-Ing. Felix Glöckler and Patent
Attorney Dipl.-Chem. Markus Coehn,
Hermann-Sack-Str. 3, 80331 Munich

vs.

Peterreins Schley

Patent- und Rechtsanwälte PartG mbB

Hermann-Sack-Straße 3
80331 Munich
Germany

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District Court of Munich
Partnership Register 1940
VAT DE 299093094

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Samsung Electronics GmbH, Am Kronberger Hang 6, 65824 Schwalbach am Taunus, legally represented by its Managing Director Man Young Kim, *same address*

– Defendant 1 –

Samsung Display Co., Ltd., 17113 Samseong-ro 1, Giheung-gu, Yongin-si, Gyeonggi-do, South Korea, legally represented by its President and CEO Joo Sun Choi, *same address*

– Defendant 2 –

Legal counsel: the attorneys admitted in Germany of Allen & Overy LLP, in particular Attorney Dr. Jan Ebersohl, Attorney Denise Benz, Maximilianstraße 35, 80539 Munich

Re: Patent Infringement (DE 10 2016 119 987 B4 – curved organic light-emitting diode)

we hereby, in the name of and on behalf of the Plaintiff, **extend** the complaint dated October 27, 2023, with respect to the German Patent **DE 10 2008 056 391 B4** (organic electronic component – “Patent-in-Suit 2”).

Value in dispute for the statement of extension of claim (preliminarily estimated): EUR 1,000,000.00

The undersigned assumes personal liability for any further court costs based on the stated value in dispute of the claim extension.

We request service via the German legal counsel of the Defendants.

At the oral hearing, in addition to the motions announced in the complaint of October 27, 2023,

we will move that:

B.

I. The Defendants be ordered

- 1.** **to cease and desist**, under penalty of a fine to be determined by the court for each violation, up to EUR 250,000.00 – or alternatively, imprisonment – or imprisonment of up to six months, in the case of repeated violations up to a total of two years, with the imprisonment to be enforced against the respective Managing Director, from:
 - a)** manufacturing, offering, placing on the market, using, or possessing for the aforementioned purposes organic electronic components, each comprising a substrate, a first electrode, a second electrode, an electron-conducting layer which is arranged such that it is electrically conductively connected to at least one of the electrodes, and which is obtained by co-evaporation of a metal

complex comprising a metal central atom and an organic compound, whereby the organic compound is coordinated to the metal complex via the co-evaporation,

(direct infringement of claim 1 of DE 10 2008 056 391 B4)

in particular when

the organic compound comprises a heteroaromatic which is conjugated via a C-C bond with an aromatic

(dependent claim 4 of DE 10 2008 056 391 B4)

and/or

the component is designed as an organic LED (OLED), which additionally comprises an organic emitting layer.

(dependent claim 9 of DE 10 2008 056 391 B4)

and/or

- b)** organic electronic components that have been manufactured using a method comprising the following method steps: A) providing a substrate, B) applying a first electrode, C) depositing an electron-conducting layer on the substrate, whereby the deposition of the electron-conducting layer is performed by simultaneous evaporation of a metal complex and an organic compound, D) applying a second electrode,

to offer, place on the market, or use within the Federal Republic of Germany, or to possess for the aforementioned purposes;

(direct infringement of claim 15 of DE 10 2008 056 391 B4 in the form of a direct product-by-process infringement)

- 2.** to provide the Plaintiff, by submission of a uniform and organized listing – including in electronic form – with full **information** as to the extent to which they (the Defendants) have engaged in the acts referred to in item 1 since May 1, 2021, specifying:
- a.** the names and addresses of the manufacturers, suppliers, and other previous owners,
 - b.** the names and addresses of the commercial purchasers as well as the sales outlets for which the products were intended,
 - c.** the quantity of the manufactured, delivered, received, or ordered products and the prices paid for said products;

whereby appropriate purchase and/or order documents (i.e., invoices, alternatively delivery notes) are to be submitted in – also electronic – copy to

substantiate the information, with the option to redact confidential details outside of the data subject to disclosure;

3. **to render an account** to the Plaintiff, both in writing and in electronic form, in a uniform, organized statement including supporting documents such as invoices, alternatively delivery notes or receipts, as to the extent to which they (the Defendants) have engaged in the acts referred to in item 1 since May 1, 2021, specifying:
 - a. the individual deliveries, broken down by delivery quantities, times, prices, and model designations, as well as the names and addresses of the purchasers,
 - b. the individual offers, broken down by offered quantities, times, prices, and model designations, as well as the names and addresses of the commercial offer recipients,
 - c. the advertising undertaken, broken down by advertising media, their circulation figures, distribution periods, and distribution areas,
 - d. the cost of production broken down by individual cost factors and the profit achieved,

whereby the Defendants reserve the right to disclose the names and addresses of non-commercial purchasers and offer recipients not to the Plaintiff but instead to an independent, sworn auditor resident in the Federal Republic of Germany and bound to confidentiality, to be designated by the Plaintiff, provided the Defendants bear the costs of said auditor and authorize and obligate him to inform the Plaintiff, upon specific request, whether a particular purchaser or offer recipient is included in the list;

4. only Defendant 1: to **surrender** the products referred to in item I.1. that are in its direct or indirect possession or ownership to a court-appointed bailiff to be designated by the Plaintiff for the purpose of destruction at the expense of Defendant 1;
5. only Defendant 1: to **recall** from commercial purchasers the products referred to in item I.1. that were placed on the market since May 1, 2021, with reference to the judicial finding (“Judgment of ... dated ...”) of the patent-infringing condition of the products and with a binding commitment to refund any payments received and to bear the necessary costs of packaging and transportation as well as any customs duties and storage costs associated with the return, and to take the products back into its possession;
6. only Defendant 1: to **permanently remove from distribution channels** those products referred to in item I.1. that have been placed on the market since May 1, 2021, or imported into the Federal Republic of Germany for the above-mentioned purposes and are in the possession of commercial customers, by

asserting its claims for delivery of possession thereof and, if such possession is not voluntarily returned, enforcing these claims;

II. to declare that the Defendants are obligated:

1. to pay the Plaintiff reasonable compensation for the acts referred to in I.1 committed between April 1, 2010, and April 30, 2021;
2. to compensate the Plaintiff for all damages suffered by OSRAM OLED GmbH since May 1, 2021, and by the Plaintiff since October 11, 2023, as a result of the acts referred to in I.1 and for all future damages resulting therefrom;

III. to determine partial securities for each awarded claim and the cost ruling, with the following individual amounts proposed:

Defendant 1 (EUR 600,000):

- Injunction (I.1.)/Destruction (I.4.)/Recall (I.5.): EUR 500,000
- Disclosure (I.2.)/Accounting (I.3.): EUR 50,000
- Costs: 110% of the respective amount to be enforced

Defendant 2 (EUR 400,000):

- Injunction (I.1.): EUR 300,000
- Disclosure (I.2.)/Accounting (I.3.): EUR 50,000
- Costs: 110% of the respective amount to be enforced

In the event that a written preliminary procedure is ordered and no timely declaration of intent to defend is made, we **request** the issuance of a default judgment pursuant to Section 331(3) sentence 1 of the German Code of Civil Procedure (ZPO).

Should the Chamber consider **severing** the proceedings under Section 145 ZPO, we hereby declare our consent.

This is a patent litigation matter for which a decision by a single judge does not appear appropriate.

No attempt at out-of-court dispute resolution within the meaning of Section 253(3) No. 1 ZPO has preceded this extension of the complaint; from the Plaintiff's perspective, mediation or any other form of out-of-court dispute resolution or conciliation hearing appears futile.

We hereby inform the Court that the Plaintiff has retained the patent attorneys of our firm, in particular Patent Attorney Dipl.-Ing. Felix Glöckler and Patent Attorney Dipl.-Chem. Markus Coehn, to participate in this patent infringement proceeding.

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STATEMENT OF GROUNDS

- 1 The Plaintiff is bringing an action against the Defendants for infringement of German Patent **DE 10 2008 056 391 B4** (also referred to as “Patent-in-Suit 2”).
- 2 The subject matter of Patent-in-Suit 2 is an organic electronic component such as an organic LED (OLED). A decisive factor for the efficiency and service life of such a component is often its electron conductivity. However, providing a layer that possesses high electron conductivity was a widespread problem ([0002]). The invention is directed toward the goal of improving electron conductivity. In doing so, it draws on the field of so-called complex or coordination chemistry, which plays an important role not only in biology but also in other fields.

A. The Parties and Formalities Relating to Patent-in-Suit 2

- 3 The Plaintiff is the sole owner and has exclusive disposal rights to the in-force Patent-in-Suit 2.

I. The Parties

- 4 The Plaintiff is the legal successor to the OLED patent portfolio of the OSRAM Group and focuses on licensing these inventions to established companies and new market participants in the field of OLED displays (<https://www.pictivadisplaysinternational.ie/>). OSRAM



was one of Germany’s technology leaders and a pioneer in the field of OLED, with over 15,000 patents, beginning large-scale research and development in the early 1990s (<https://www.osram.de/cb/>). The company introduced, among other things, state-of-the-art OLED design and manufacturing processes and marketed OLED display panels itself, including under the “Pictiva” label. The OLED portfolio of Osram, to which the Plaintiff holds title, includes more than 1,000 patents.

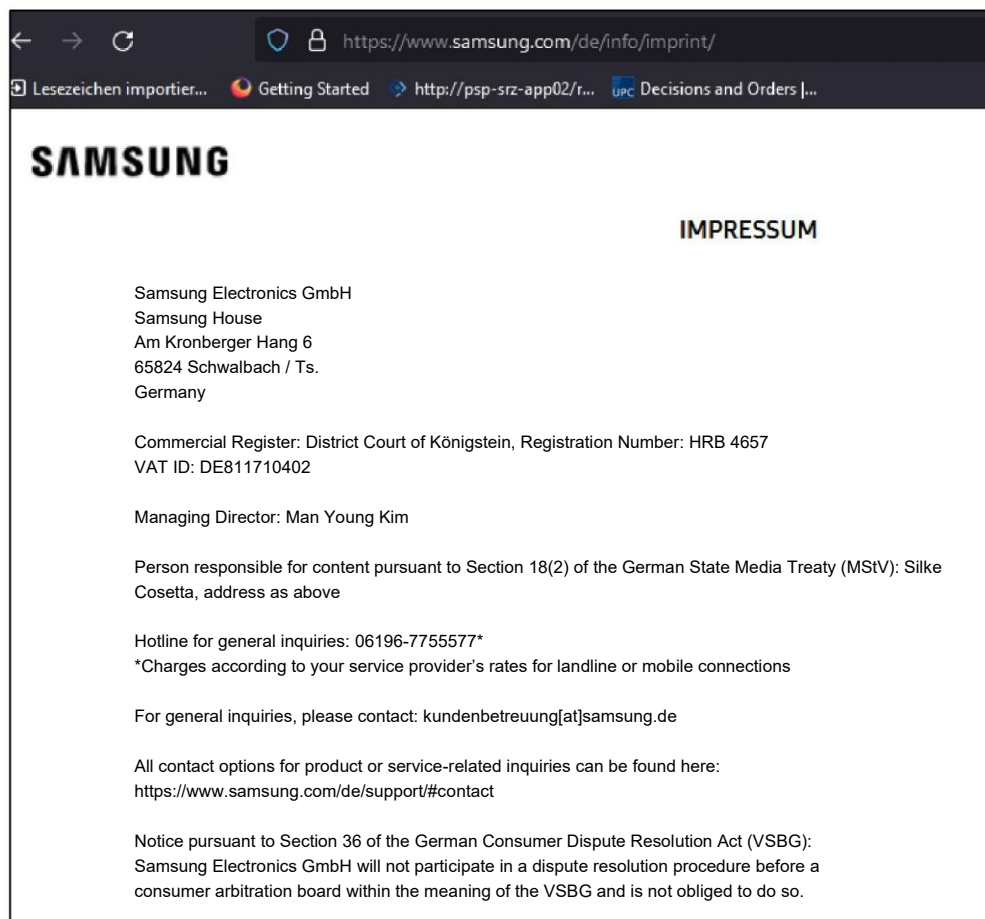
- 5 **Samsung** Electronics Co., Ltd. of South Korea is one of the world’s largest manufacturers of smartphones, tablets, and other mobile devices. Samsung Electronics Co., Ltd. is one of

the most important parts of the Samsung Group and is particularly responsible within the Group for the mobile communications segment.

- 6 **Defendant 1**, headquartered in Schwalbach am Taunus, is the German distribution subsidiary of Samsung Electronics Co., Ltd. A current excerpt from the commercial register is submitted as

– Exhibit PSKERW 1 –.

- 7 According to the legal notice at <https://www.samsung.com/de/info/imprint/>



Defendant 1 is responsible for the German-language website <https://www.samsung.com/de/as> as well as the integrated online store.

- 8 **Defendant 2**, Samsung Display Co., Ltd., was spun off from Samsung Electronics Co., Ltd. in 2012 by merging the LCD and Mobile Display divisions:

Monday, April 2nd 2012



The World's Largest Display Manufacturer, Samsung Display is Launched

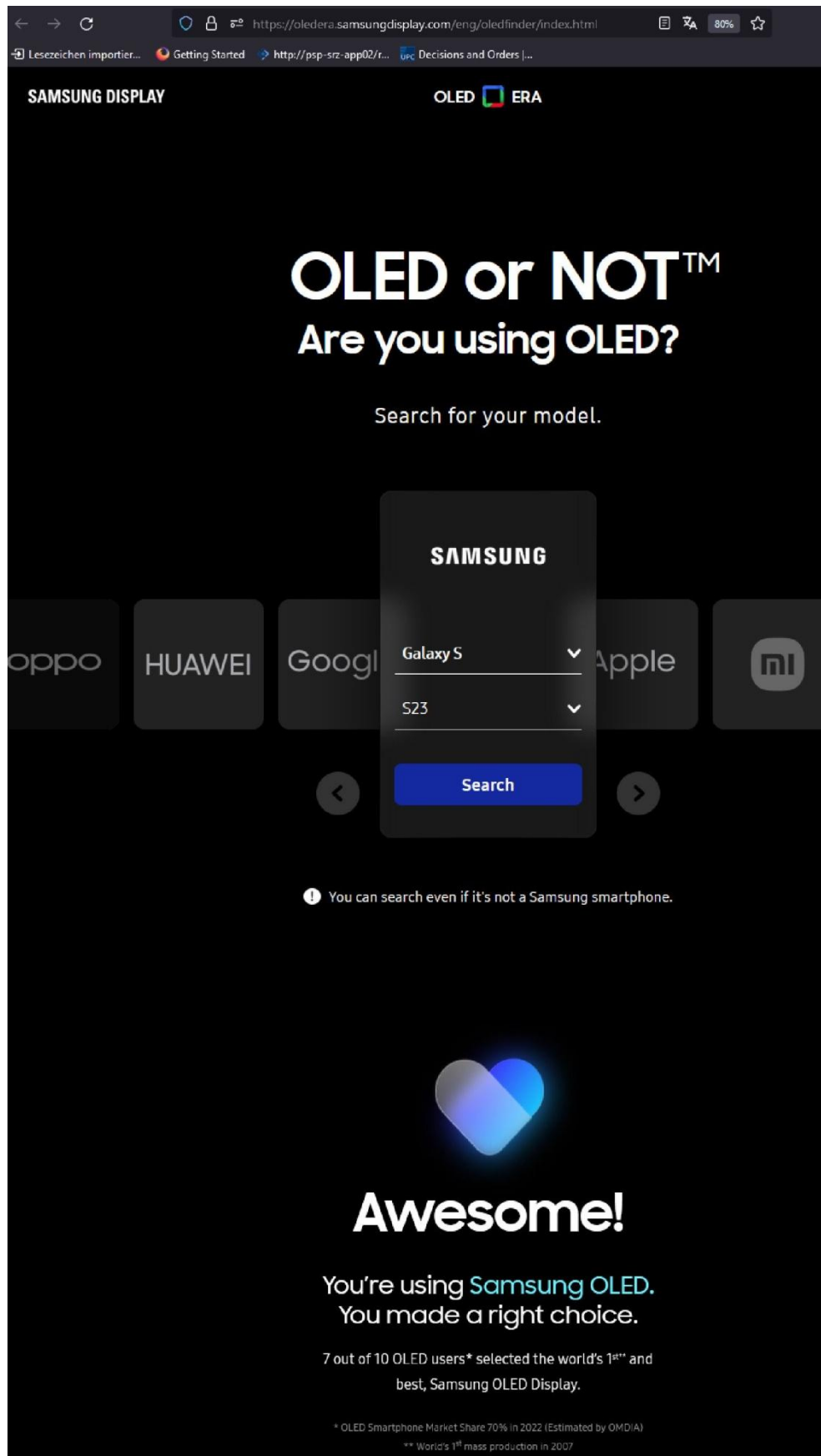
PRESS RELEASE by btarunr | Apr 2nd, 2012 08:08 | Discuss (11 Comments)

Samsung Display Co., Ltd, a global leader in display panel technologies and products, announced today that it has been officially launched as a new corporation, spun off from Samsung Electronics. Samsung Display held its inauguration ceremony yesterday and will begin business operations in earnest after carrying out incorporation registration on April 3.

Donggun Park, executive vice president and head of the former Samsung Electronics' LCD Business was elected CEO of Samsung Display. The company, which recorded 22.7 trillion KRW (approximately 20 billion U.S. dollars) in annual revenue in 2011 as Samsung Electronics' LCD Business, became the world's largest display manufacturer overnight, based on its 20,000 employees and five production facilities worldwide.

Source: <https://www.techpowerup.com/163431/the-worlds-largest-display-manufacturer-samsung-display-is-launched>

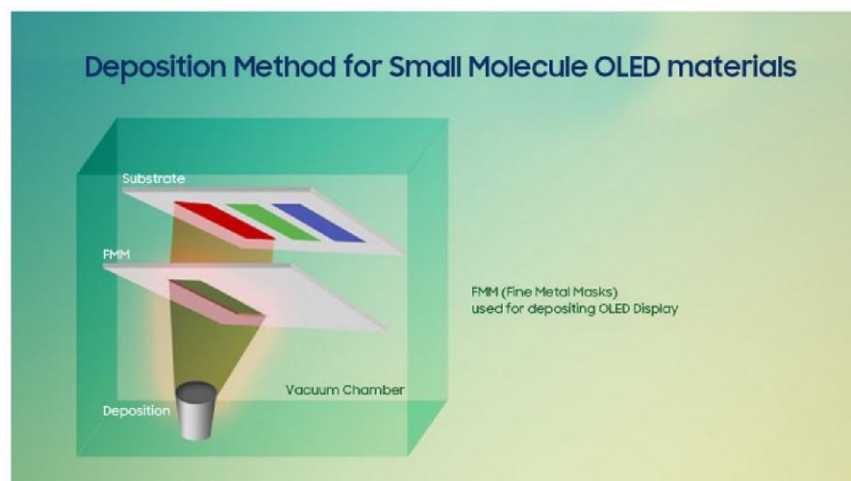
- 9 According to its own statements, it is number 1 in the global display market. It knows which Samsung mobile phones use its OLED displays and that those are distributed worldwide. Its website is located at <https://www.samsungdisplay.com/eng/index.jsp>. It is the manufacturer of the contested OLED displays:



<https://oledera.samsungdisplay.com/eng/oledfinder/index.html>

10 A brief description of its manufacturing process can be found at <https://global.samsungdisplay.com/31061:>

When researchers at Eastman Kodak built the first practical application of OLED in 1987, they used small molecules. Since then, small molecule OLEDs have gone through numerous evolution and are being used in most commercialized OLED displays.



Small molecule OLEDs are generally fabricated by evaporation process that heats up these materials to be utilized as display picture elements. Since every RGB pixel requires a different material, fine metal mask (FMM) is used to deposit small molecules in each display pixel area.

As small molecules are lighter than polymers, they can be used during the evaporation process, which enables intricate patterning as well as remarkable light emission performance.

This states:

“When researchers at Eastman Kodak built the first practical application of OLED in 1987, they used small molecules. Since then, small molecule OLEDs have gone through numerous evolution [sic] and are being used in most commercialized OLED displays.

Small molecule OLEDs are generally fabricated by **evaporation process** that heats up these **materials** to be utilized as display picture elements. Since every RGB pixel requires a different material, fine metal mask (FMM) is used to deposit small molecules in each display pixel area.

As small molecules are lighter than polymers, they can be used during the evaporation process, which enables intricate patterning as well as remarkable light emission performance.”

II. Formalities of Patent-in-Suit 2

11 We are submitting Patent-in-Suit 2, DE 10 2008 056 391 B4, as

– **Exhibit PS_{KERW} 2** –.

12 The application on which Patent-in-Suit 2 is based was filed by OSRAM Opto Semiconductors GmbH on November 7, 2008, and was published on April 1, 2010. The patent claims internal priority from September 26, 2008. The notice of grant was published on April 1, 2021. According to the patent register, an up-to-date excerpt of which we submit as

– **Exhibit PS_{KERW} 3** –,

Patent-in-Suit 2 was assigned by OSRAM Opto Semiconductors GmbH to OSRAM OLED GmbH, with the assignment published in the register on March 19, 2015.

13 This transfer was based on the incorporation of OSRAM OLED GmbH by way of a spin-off from OSRAM Opto Semiconductors GmbH, whose registration in the commercial register occurred on June 2, 2014. As part of the associated transfer of a business unit, which also included the transfer of intangible assets, OSRAM OLED GmbH became the holder of Patent-in-Suit 2 on June 2, 2014.

14 In this regard, we submit a redacted version of the notarial deed dated May 26, 2014 concerning the spin-off from a GmbH and formation of a new GmbH, with notarial deed number W 1997/14,

– **Exhibit PS_{KERW} 4** –,

from which Section B § 4(1) shows the spin-off and new formation. The transfer of intangible assets follows from Section B § 4(3)(a) in conjunction with Annex 2. There, the patent-in-suit is listed under item number 986.

15 According to the commercial register excerpt HRB 14247 of the Local Court of Regensburg, OSRAM OLED GmbH is controlled by OSRAM Opto Semiconductors GmbH, which in turn is controlled by OSRAM GmbH, as shown in the commercial register excerpt HRB 8522 of the same court,

– **Exhibits PS_{KERW} 5 and 6** –.

- 16 As the parent and controlling company of OSRAM OLED GmbH, OSRAM GmbH assigned Patent-in-Suit 2 to the Plaintiff by way of an “Assignment” in an agreement dated October 11, 2023 (“3rd Amendment” to PATENT PURCHASE, LICENSE AND EXPLOITATION AGREEMENT dated June 26, 2020). We submit a redacted version of this agreement as

– Exhibit PSKERW 7a –.

- 17 Clause 2(c) of the “3rd Amendment” agreement refers to Clause 2 of the PATENT PURCHASE, LICENSE AND EXPLOITATION AGREEMENT.

– Exhibit PSKERW 7b –.

- 18 According to that provision, all rights to the specifically identified patents, including claims for past damages, were transferred to the Plaintiff. It states under (a) (bold emphasis added by us):

„Patent Sale and Assignment. Subject only to the Existing Encumbrances, OSRAM, for the commercial benefit of itself and the Affiliate Owners, hereby agrees **to sell and, effective upon the Closing Date, assigns, transfers and conveys to Assignee all of OSRAM’s and the Affiliate Owners’ right, title and interest in and to the Assigned Patents,** including without limitation, any **and all legal rights of OSRAM or the Affiliate Owners to sue for past, present and future infringement, to pursue damages, injunctive or other equitable relief and other remedies for past, current and future infringements,** to collect royalties, to prosecute all existing Assigned Patents worldwide, to apply for additional Patents worldwide, to revive Abandoned Patents, and to enjoy all statutory rights conferred under the Assigned Patents, including the right to practice the Assigned Patents and exclude others from practicing the inventions claimed therein. In addition, Assignee shall be permitted to have applicable Patents issue in the name of Assignee. OSRAM, for the commercial benefit of itself and the Affiliate Owners, also hereby sells **and, effective upon Closing, assigns,** all of OSRAM’s and the Affiliate Owners’ right to sue for past infringement, to pursue damages, injunctive or other equitable relief and other remedies for past infringements in relation to the intellectual property rights included in Exhibit 1 which may have already expired or lapsed for whatever reason.”

In our own translation:

“Patent Sale and Assignment. Subject only to the Existing Encumbrances, OSRAM, for the commercial benefit of itself and the Affiliate Owners, hereby agrees **to sell and, effective upon the Closing Date, assigns, transfers and conveys to Assignee all of OSRAM’s and the Affiliate Owners’ right, title and interest in and to the Assigned Patents,** including without limitation, any **and all legal rights of OSRAM or the Affiliate Owners to sue for past, present and future infringement, to pursue damages, injunctive or other equitable relief and other remedies for past, current and future infringements,** to collect royalties, to prosecute all existing Assigned Patents worldwide, to apply for additional Patents worldwide, to

revive Abandoned Patents, and to enjoy all statutory rights conferred under the Assigned Patents, including the right to practice the Assigned Patents and exclude others from practicing the inventions claimed therein. In addition, Assignee shall be permitted to have applicable Patents issue in the name of Assignee. OSRAM, for the commercial benefit of itself and the Affiliate Owners, also hereby sells **and, effective upon Closing, assigns**, all of OSRAM's and the Affiliate Owners' right to sue for past infringement, to pursue damages, injunctive or other equitable relief and other remedies for past infringements in relation to the intellectual property rights included in Exhibit 1 which may have already expired or lapsed for whatever reason."

- 19 The transfer of Patent-in-Suit 2, which is listed in the second line of Annex 1 of the "3rd Amendment" agreement, takes effect pursuant to Clause 2(a) of the agreement on the "3rd Amendment Date." According to the definition on page 2 before "RECITALS," this date is October 11, 2023.

Annex 1 – List of 3 rd Amendment Patents							
Seller File Reference	Country code	Filing date	Application number	Publication date	Publication number	Issue date	Issue number
2008P22003 DE01	DE	07.11.2008	10 2008 056 391.9	01.04.2010	10 2008 056 391	01.04.2021	10 2008 056 391

- 20 The recordation of the transfer in the German Patent Register was applied for in early February 2024. While it has not yet been completed, a telephone inquiry with the German Patent and Trade Mark Office (DPMA) confirmed that it will take place shortly.
- 21 Patent-in-Suit 2 is in force.

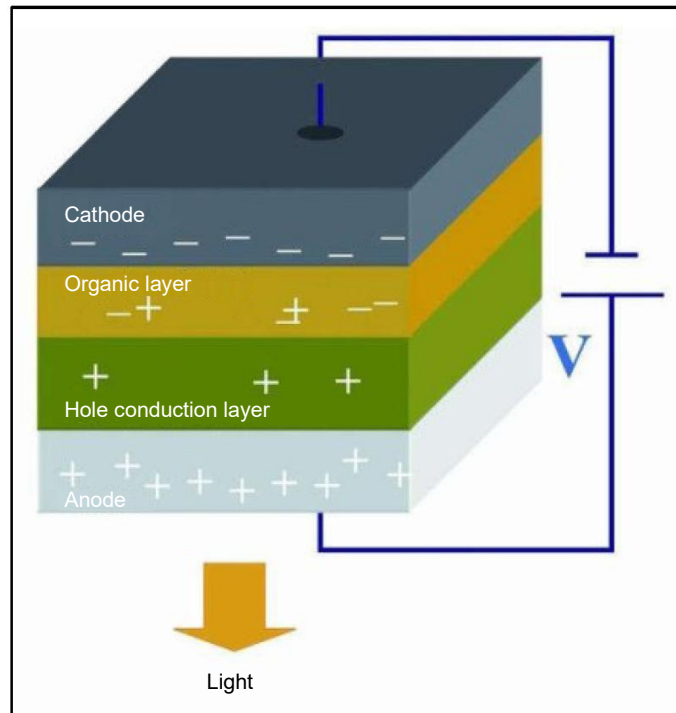
B. On the Subject Matter of Patent-in-Suit 2

- 22 We will begin by explaining the technical background and the core of the claimed teaching (I.), and then proceed to interpret individual features of patent claim 1 and the interplay of those features (II.).

I. Technical Background and Core of the Claimed Teaching

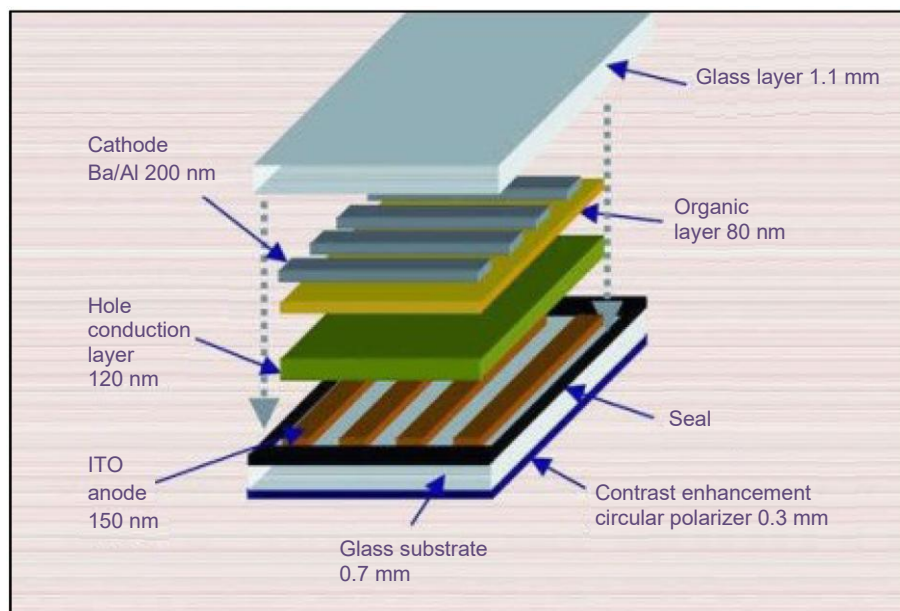
1. On the Technological Field of the Invention

- 23 The invention is situated in the context of organic electronic components. “Organic” in this context refers to carbon-based chemical compounds. The OLEDs (short for “organic light-emitting diodes”) cited in Patent-in-Suit 2 and named in dependent claim 9, are, simply put, the basic building blocks of a self-luminous display. OLED displays have a simple basic structure comprising one or more thin organic films between two electrodes (anode and cathode).
- 24 As organic materials, particularly long-chain polymers or small molecules are used. When a voltage is applied, electrons are injected from the cathode into the film. At the same time, holes (positive charges) are injected from a transparent anode with high work function into the organic material. In the applied electric field, holes and electrons migrate through the organic film and, upon recombination, form excited states that decay with the emission of photons, thereby generating light.
- 25 The process can be simplified as follows: when voltage is applied, the cathode injects electrons into the film (the illustration below shows a so-called *bottom emitter*, in which the light is emitted downward, i.e., through the anode. In contrast, in so-called top emitters like the contested embodiments, the light is emitted upward through the cathode):



Source: <https://www.elektronikpraxis.vogel.de/funktionsweise-und-eigenschaften-von-oleds-a-44614/>

- 26 The typical structure of an OLED display can be represented in simplified form as follows, bearing in mind that this naturally shows a specific type of OLED and the dimensions are provided purely by way of example:



Source: <https://www.elektronikpraxis.vogel.de/funktionsweise-und-eigenschaften-von-oleds-a-44614/>

- 27 The introductory article “Functionality and Properties of OLEDs” from ElektronikPraxis, from which these illustrations are taken, is submitted as

– **Exhibit PSKERW 8** –.

- 28 It dates from 2006 and thus just before the priority date of Patent-in-Suit 2.
- 29 One approach used in high-resolution mobile OLED displays to produce red, green, and blue light for full-color image reproduction is to structure red, green, and blue OLED subpixels into each pixel of the display.

2. On the Subject Matter of the Invention

- 30 Paragraph [0002] of Patent-in-Suit 2 (all references in the format “para. [...]” without further qualification below refer to Patent-in-Suit 2) summarizes the background of the invention as already briefly outlined above, with respect to electron conductivity:

“A widespread problem in organic electronic components is providing a layer that has very high electron conductivity. The electron conductivity in the component is often the critical factor for the efficiency and service life of the component. In an organic LED (OLED), recombination of electrons and holes forms excitons, which can excite substances to emit radiation. In such components, luminescence also directly depends on the exciton density, which in turn depends on the recombination of electrons and holes.”

- 31 The purely crystalline layers that were sometimes used for electron transport had the disadvantage of exhibiting regions of differing conductivity, which led to uneven electron flow within the layer and, in the case of electroluminescent components, to non-uniform emission.
- 32 Among the prior art, Patent-in-Suit 2 mentions, inter alia, US 2008/0258610 A1, which had been cited in the grant proceedings,

– Exhibit PSKERW 9 –.

However, the invention fundamentally differs from it in that it involves, inter alia, the evaporation of a metal complex, whereas US '610 concerns a metal oxide – and even that only with respect to an electron-conducting, not a hole-conducting, layer (further details below).

- 33 According to paragraph [0004], one object of embodiments of the invention is to provide an electron-conducting layer in an organic electronic component that has high electron conductivity.
- 34 Patent-in-Suit 2 proposes a solution in the form of the teaching of its **claim 1**, which protects a **product** and can be structured as follows:

1	Organic electronic component comprising
a)	a substrate,
b)	a first electrode,
c)	a second electrode,
d)	an electron-conducting layer,
aa)	which is arranged such that it is electrically conductively connected to at least one of the electrodes,
bb)	which is obtained by co-evaporation of a metal complex that includes a metal central atom, and an organic compound, whereby
(1)	through the co-evaporation the organic compound is coordinated to the metal complex.

35 Dependent claims 2–14 relate to preferred embodiments of the protected electronic component.

36 **Dependent claim 4** can be structured as follows:

4	Organic electronic component according to one of the preceding claims,
a)	wherein the organic compound includes a heteroaromatic,
aa)	which is conjugated via a C–C bond with an aromatic.

37 **Dependent claim 9** can be structured as follows:

9	Organic electronic component according to one of the preceding claims,
a)	designed as an organic LED (OLED),
aa)	which additionally comprises an organic emitting layer.

38 Independent **claim 15** independently protects a **method** for producing an organic electronic component. Thus, alongside the method, it also protects the direct product of the

manufacturing method under Section 9 sentence 2 no. 3 of the German Patent Act (PatG).
It can be structured as follows:

15	Method for producing an organic electronic component, comprising the following method steps:
a)	A) Providing a substrate,
b)	B) Applying a first electrode,
c)	C) Depositing an electron-conducting layer on the substrate,
aa)	wherein the deposition of the electron-conducting layer takes place by simultaneous evaporation of a metal complex and an organic compound,
d)	D) Applying a second electrode.

To facilitate reference, we submit these feature analyses as

– **Exhibit PSKERW 10** –.

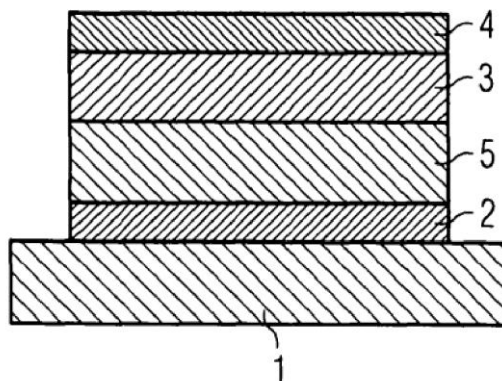
- 39 The applicant was able to empirically demonstrate the positive effects on electron conductivity, as evidenced by paragraph [0076]:

“The measurement curves shown in Figs. 5 to 8 each clearly demonstrate that the presence of the metal complex, which was co-evaporated with the organic compound to form an electron-conducting layer, has a positive influence on the measured electrical and optoelectronic parameters. In the corresponding organic electronic components, higher current density, greater luminescence, improved efficiency, and longer service life were achieved by the co-evaporation of the metal complex with the organic compound.”

II. On the Interpretation of Claim 1 and of Claim 15

- 40 Patent-in-Suit 2 uses terminology consistent with the established technical understanding in the fields of electrical engineering and chemistry. In the following, we will also refer to the drawings of Patent-in-Suit 2 for explanation. These are purely exemplary embodiments (cf. para. [0011]).
- 41 Figure 1 shows a simple exemplary embodiment of such an electronic component in the form of an OLED (see para. [0062]):

FIG 1



42 This organic light-emitting diode and its basic mode of operation are explained in para. [0063]:

“**Fig. 1** shows a layer sequence comprising a substrate **1**, with a first electrode **2** and a second electrode **4** arranged thereon. Between the two electrodes lie the electron-conducting layer **3** and the emitting layer **5**. By applying voltage to the electrodes, electrons are injected from one of the electrodes, the cathode, into layers **3** and **5**, and holes from the other electrode. Through the recombination of the electrons and holes, excitons may form. In the embodiment shown in **Fig. 1**, the radiation is emitted from the emitting layer **5**. This layer contains substances that can be excited to emission by excitons. These may be, for example, phosphorescent or fluorescent substances.”

43 The substrate is a carrier material on which the remaining stack is located. Sandwiched between the two electrodes 2 and 4, the anode and cathode of the OLED, are an emitting layer 5 (not expressly required by the claim) and an electron-conducting layer 3. In this exemplary embodiment, the latter is in contact with the electrode 4 arranged directly above it and is thus electrically conductively connected to it. As described in para. [0063], however, the electron-conducting layer can also be divided into an electron transport layer and an electron injection layer. The typically very thin electron injection layer facilitates the transfer of electrons from the cathode into the electron transport layer.

44 An **exciton** is an excited state in the electron system of semiconductors and insulators that is associated with the formation of an electron-hole pair. The excitation of an electron in a solid leaves a hole at the excited atom or in the valence band. Due to the Coulombic attraction, the positively charged hole attracts the excited negatively charged electron. Electron and hole do not move independently, but as a bound entity through the solid and can thereby transport excitation energy (though not charge). An exciton is therefore a

mobile excitation state that can propagate as a wave (polarization wave) through the material.

- 45 Regarding the specific significance of the inventive solution, para. [0007] states (emphasis added):

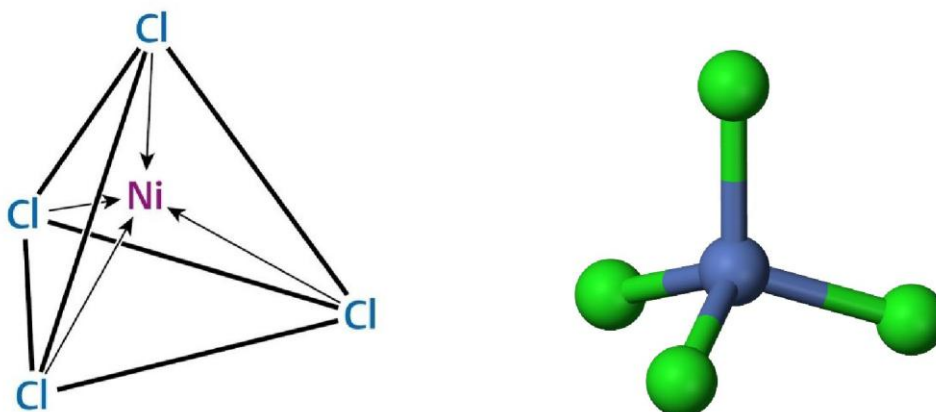
“Through the co-evaporation of the metal complex with an organic compound, these two compounds interact with each other in the gas phase or upon encountering the substrate surface. This interaction leads to **coordination** between the compounds. The compounds are deposited in the coordinated state, resulting in the formation of a layer exhibiting local order. Local order is to be understood to mean that while the entire layer is not crystalline as such, the organic compounds are arranged in a specific pattern around the metal complex in its immediate environment, depending on the selected metal complex and the organic compound. The entire layer as such, however, is amorphous and thus exhibits no long-range order. Through the coordination of the organic compound to the metal complex, and the associated orbital overlap, **additional electrons** can be transferred from the metal to the ligand via a metal-to-ligand electron transfer (metal–ligand charge transfer complex). These electrons can be available for electron transport in the organic electronic component. The **increase in ‘free’ electrons** significantly improves the electron conductivity in the component. This leads to an increase in the efficiency and service life of the organic electronic component.”

- 46 Beyond this, only **feature group 1 d) bb)** still requires explanation. According to it, the electron-conducting layer (3) is obtained by co-evaporation of a metal complex, which comprises a metal central atom, with an organic compound.

- 47 Complex compounds (also “coordination compounds”) are composed of a central atom and one or more ligands, with the ligands surrounding the central atom. The number of ligands bound to the central atom is referred to as the coordination number and is most often 2, 4, or 6.

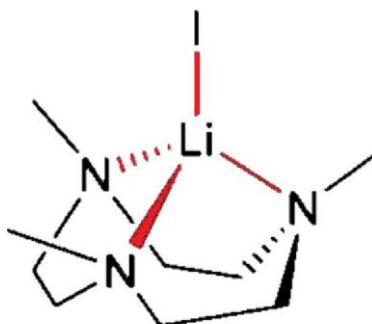
- 48 More precisely, complex compounds are structures in which a central atom (usually a metal ion), which has an electron deficiency in its electronic configuration, is surrounded by one or more molecules or ions (the ligands), each of which donates electron density from its orbitals to the orbitals of the central atom to compensate for the electron deficiency. This interaction between the orbitals of the central atom and the ligands is referred to as a coordinative or coordination bond.

- 49 If the central atom is a metal (metal ion), it is called a “metal complex.” A classical teaching example is the tetrachloronickelate complex $[\text{Ni}(\text{Cl})_4]^{2-}$:



This complex consists of nickel as the central ion and 4 chloride ions as ligands. The coordination number is 4. The complex is tetrahedral, with the nickel cation at the center of the tetrahedron and the chloride ions forming the tetrahedron's vertices. The coordinative bonds are represented as arrows.

- 50 Lithium ions can also form metal complexes, typically with four ligands. One example is the complex of the lithium ion (Li^+) with the anion iodide (I^-) and the neutral compound 1,4,7-triazacyclononane (TACN). TACN contains three nitrogen atoms (N), each capable of forming a coordination bond with the lithium central atom. The fourth coordination bond is formed by the iodide. As with the tetrachloronickelate, the lithium atom forms a tetrahedral complex, with TACN surrounding the lithium atom from several sides and occupying three of the four tetrahedral vertices. Iodide occupies the fourth tetrahedral vertex. The exact structure of the complex is shown in the following illustration, with the coordinative bonds highlighted in red and the three-dimensional structure indicated using wedge and dashed bonds. Wedge bonds project out of the plane of the page, while dashed bonds lie behind the page plane.



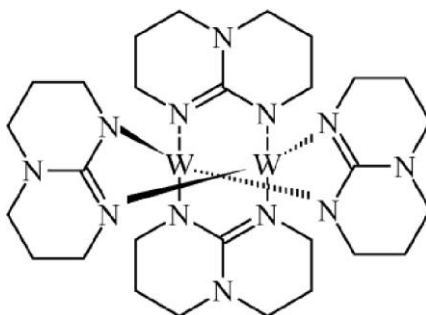
- 51 In chemistry, “**evaporation**” refers to the phase transition of a substance from the liquid to the gaseous state. Two (or more) substances evaporate “**together**” when neither evaporates first and the other subsequently, in the sense of a sequential process.

52 A compound is “**organic**” if it is carbon-based. So-called organic chemistry encompasses all compounds of carbon with other elements.

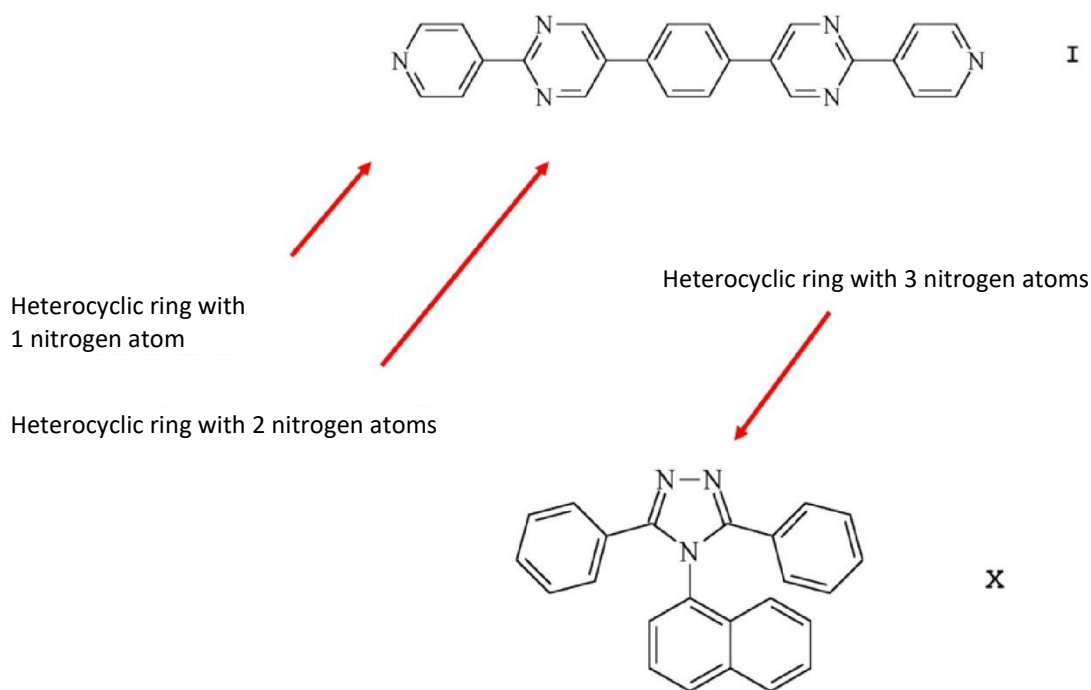
53 A compound becomes “coordinated” to the metal complex through co-evaporation when it binds to the metal complex via a coordination bond. As a result, the co-evaporation transports the metal complex and the organic compound onto the surface of the electronic component and enables spatial proximity between the metal complex and the organic compound in the forming electron-conducting layer, such that the orbitals of the organic compound interact with the orbitals of the central atom of the metal complex and one (or more) coordination bond(s) can be formed. Para. [0034] further explains:

“By selecting suitable metal complexes, for example dinuclear metal complexes, and suitable organic compounds such as compounds I to XXIII, the co-evaporation of the metal complex with the organic compound in the gas phase or on the deposited surface results in interactions such that the compounds coordinate with each other. The coordination is retained during the formation of the electron-conducting layer.”

54 Accordingly, both the metal complex – or more precisely, the metal of the metal complex – and the organic compound must be capable of forming a coordination bond. As illustrated above using the example of the lithium complex LiI(TACN), lithium ions are capable of forming coordination bonds. With respect to suitable organic compounds, para. [0034] refers to compounds I to XXIII. These compounds are all characterized by the presence of nitrogen atoms (N). As also evident from the lithium complex LiI(TACN), nitrogen-containing organic compounds are capable of forming coordination bonds with a metal complex via their nitrogen atoms. This property of nitrogen atoms is also demonstrated in para. [0014] for a tungsten-containing (W-containing) metal complex:



- 55 The precise chemical structure of the nitrogen compound plays only a subordinate role here, since nitrogen atoms possess a lone pair of electrons that is particularly suitable for forming coordination bonds.
- 56 Para. [0034] identifies, as preferred organic compounds, for example compounds I and X, which contain nitrogen-based ring systems with 1, 2, or 3 nitrogen atoms per ring:

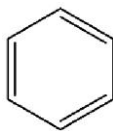


III. On the Interpretation of the Relevant Dependent Claims

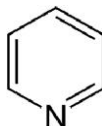
1. Claim 4

Organic electronic component according to any of the preceding claims, wherein the organic compound comprises a heteroaromatic that is conjugated via a C–C bond with an aromatic.

- 57 An **aromatic** is an organic molecule that contains at least one ring of carbon atoms. The chemical bonds of the ring form a fully conjugated system of double bonds. This may consist, for example, of alternating single and double bonds between pairs of carbon atoms. One example of an aromatic is benzene, which contains six carbon atoms. The single and double bonds are conventionally represented by single and double lines:



- 58 A **heteroaromatic** is an aromatic in which at least one heteroatom is incorporated into the ring. Heteroatoms are defined as atoms that are neither carbon nor hydrogen. In known heteroaromatics, these are frequently nitrogen or oxygen atoms. In the pyridine compound shown below, a nitrogen atom (N) is incorporated into the six-membered ring:



- 59 A bond that **conjugates** the heteroaromatic with the aromatic is a chemical bond through which the conjugated double bond system described above extends across both molecules. For example, it creates a sequence of single and double bonds that spans both the heteroaromatic and the aromatic.

2. Claim 9

Organic electronic component according to any of the preceding claims, designed as an organic LED (OLED), which additionally comprises an organic emitting layer.

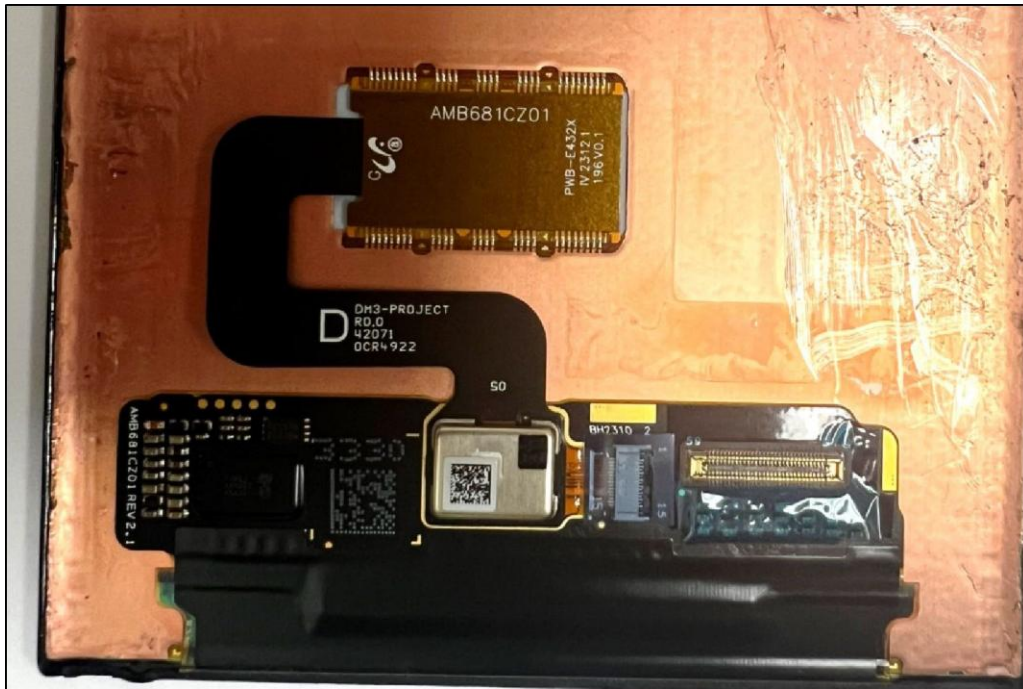
- 60 An LED whose emitting layer is an organic layer is an OLED. This is shown in Figure 1 with reference numeral 5.

C. On the Contested Products

- 61 The Defendant advertises and distributes, inter alia, smartphones of the Samsung Galaxy S series in Germany, including the model S23.



- 62 The model examined, which was purchased in Germany, is a Galaxy S23 Ultra. This model includes an OLED display that falls within the scope of protection of Patent-in-Suit 2. In the case of the examined Samsung Galaxy S23 Ultra, the display in question was one marketed by Defendant 2 under the designation “AMB681CZ01.” This can be seen at the top of the image shown below:



63 Enlarged view:



64 On the website of Defendant 2, <https://www.samsungdisplay.com/eng/patents.jsp>, this display is listed under the heading “Product”:

OLED Display Technology Patents

The list of patent below is prepared solely to comply with 35 U.S.C. 287. The information below is not intended, and should not be used, for any other purpose.

Product	Phone
AMB623TS01, AMB667TY01, AMB687TZ01, AMS646YD05, AMB624XT01, AMB667XU01, AMB681XV01, AMB606AW01, AMB655AY01, AMB681AZ01, AMB606CX01, AMB655CY01, AMB681CZ01 , AMF670UH01, AMB114UN01, AMF670ZA01, AMB190ZB01, AMF670BS01, AMB729WA01, AMB458WJ01, AMF759VG01, AMB623VH01, AMF755ZE01, AMB623ZF01, AMF756BQ01 or AMB619BR01	Galaxy S20, Galaxy S20 Plus, Galaxy S20 Ultra, Galaxy S20 FE 5G, Galaxy S21, Galaxy S21 Plus, Galaxy S21 Ultra, Galaxy S22, Galaxy S22 Plus, Galaxy S22 Ultra, Galaxy S23, Galaxy S23 Plus, Galaxy S23 Ultra, Galaxy Z Flip1, Galaxy Z Flip2, Galaxy Z Flip3, Galaxy Z Flip4, Galaxy Z Fold1, Galaxy Z Fold2, Galaxy Z Fold3 or Galaxy Z Fold4

D. On the Infringement of the Patent-in-Suit

65 The contested embodiments make literal use of the subject matter of Patent-in-Suit 2 according to claim 1 and, in the form of the direct product of the manufacturing method, according to claim 15, as investigations have shown. The investigations were conducted at the specialist laboratory of Novateq Solutions (“Novateq”; see <https://novateq.solutions/>) in California. Novateq is a technical consulting firm that offers reverse engineering and expert services in the fields of software and hardware. Its staff includes scientists and engineers with decades of experience in the field of semiconductor components (light-emitting diodes, particularly OLEDs, photovoltaics, photodetectors, capacitors, and touch sensors), spanning materials design and development, component architecture and fabrication, device physics, and the design and layout of control circuits. As part of these investigations, measurements were taken and images created, which are introduced below.

66 Regarding the subject and results of the investigations presented below, we offer as

Evidence: Mr. Jiang Liu, Novateq, LLC, 65 Evening Sun, Irvine, CA 92620, USA, to be summoned through the Plaintiff

– as a witness –.

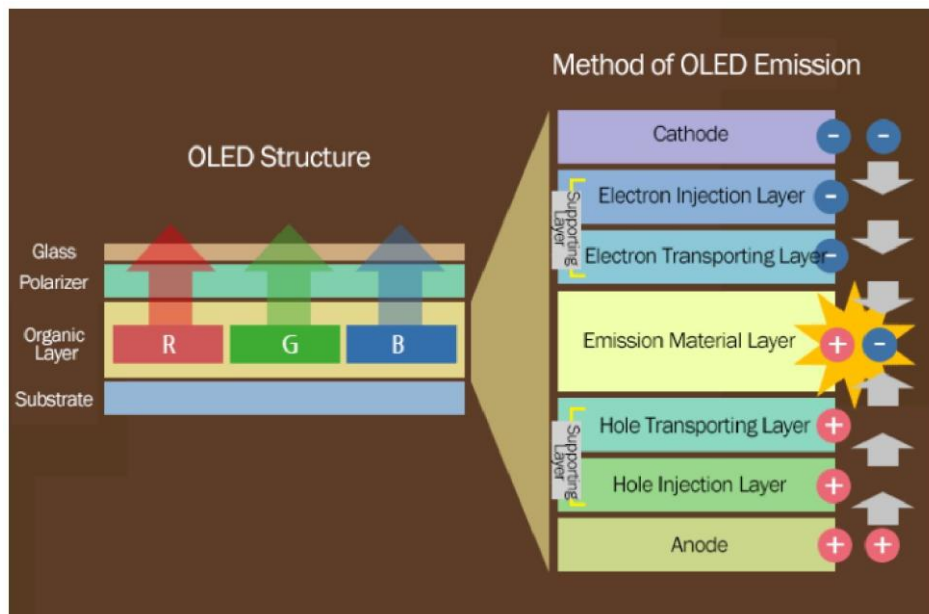
Mr. Liu earned his doctorate in electrical engineering from Linköping University in Sweden and conducted postdoctoral research on OLEDs at the University of California in Los Angeles (UCLA). He subsequently spent several years intensively working on flexible OLEDs and the fabrication of OLEDs, among other topics. He is an expert in reverse engineering of software and hardware. The above-mentioned investigations were conceived, carried out, and documented under his primary direction and supervision at Novateq. A summary report of his investigations, to which we will return in detail below, is submitted as

– Exhibit PSKERW 11 –.

- 67 It uses the standard English abbreviations for the various layers that may constitute the organic stack between the cathode and the anode, as follows:

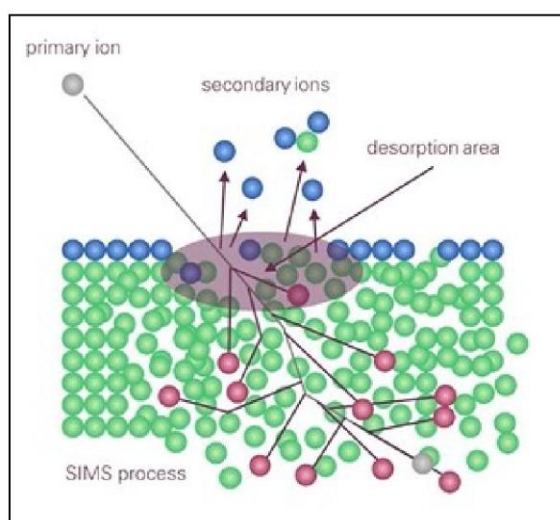
	Cathode
EIL	Electron Injection Layer
ETL	Electron Transport Layer
HBL	Hole Blocking Layer
EML	Emissive Layer
HTL	Hole Transport Layer
HIL	Hole Injection Layer
	Anode

- 68 As presented by Defendant 2:



Source: <https://global.samsungdisplay.com/28687/>

- 69 The investigations employed so-called **time-of-flight secondary ion mass spectrometry (TOF-SIMS)**. This is a surface analysis technique that combines secondary ion mass spectrometry (SIMS) with a time-of-flight (TOF) mass analyzer. Using this technique, chemical compounds in the individual layers of the OLED can be clearly identified.
- 70 **Mass spectrometry** is a method for measuring the mass of atoms or molecules. Its operating principle is to ionize chemical compounds, resulting in charged molecules or molecular fragments whose mass is measured by the detector of the mass spectrometer.
- 71 In a secondary ion mass spectrometer, the sample to be examined is gently bombarded in a vacuum with a primary ion beam of low kinetic energy. The primary ions collide with the surface of the sample, transferring their energy and generating a collision cascade on the surface. This cascade causes individual surface atoms and molecules to be ejected from the surface.



- Some of these secondary particles are ions, referred to as secondary ions. Since the secondary ions originate exclusively from the near-surface layers, it is possible to examine the chemical composition of a sample layer by layer in depth.
- 72 In the present investigation, the organic layers of the OLED, with a total thickness of approx. 280 nm, were examined with a depth resolution of less than 5 nanometers – that is, layer by layer, with layer thicknesses of less than 5 nanometers each.

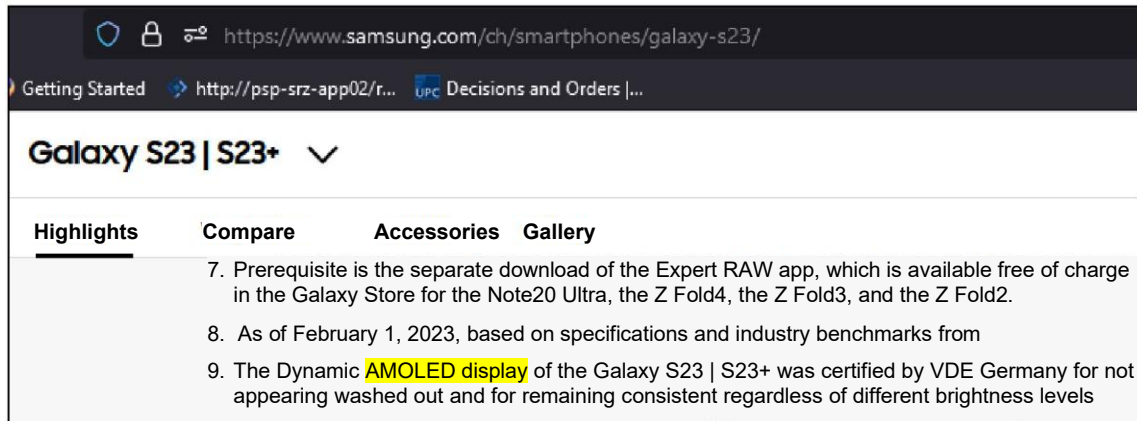
- 73 The secondary ions ejected from each individual layer can then be analyzed separately for their mass. To do this, they are transferred into a time-of-flight mass spectrometer that is coupled to the mass spectrometer.
- 74 In a **time-of-flight mass spectrometer**, the mass is determined by measuring the time-of-flight (TOF) of the ionized molecules. To this end, the charged molecules or molecular fragments generated in the mass spectrometer are accelerated in an electric field toward a detector. Heavier particles accelerate more slowly than lighter ones and therefore strike the detector later. The flight time of the particles is thus proportional to their mass. Consequently, the mass of a particle can be calculated from its time-of-flight to the detector.
- 75 Time-of-flight secondary ion mass spectrometry thus makes it possible to determine the molecular mass of the organic compounds present in the individual layers. Moreover, the ions of the organic compounds also fragment into smaller pieces, the so-called fragments. The fragmentation patterns observed are not arbitrary but follow known patterns – e.g., an ionized molecule tends to break into stable fragments. If these fragments are ionic in nature, they too can be detected in the TOF mass spectrometer and allow further conclusions to be drawn about the chemical structure of the organic compounds. By combining this information, a chemical compound can be unambiguously identified, and this can be done with depth resolution for each organic layer of the OLED.
- 76 Time-of-flight secondary ion mass spectrometry is today an established detection method.

I. Claim 1

1. Feature Group 1

Organic electronic component comprising a substrate, a first electrode, a second electrode, an electron-conducting layer,

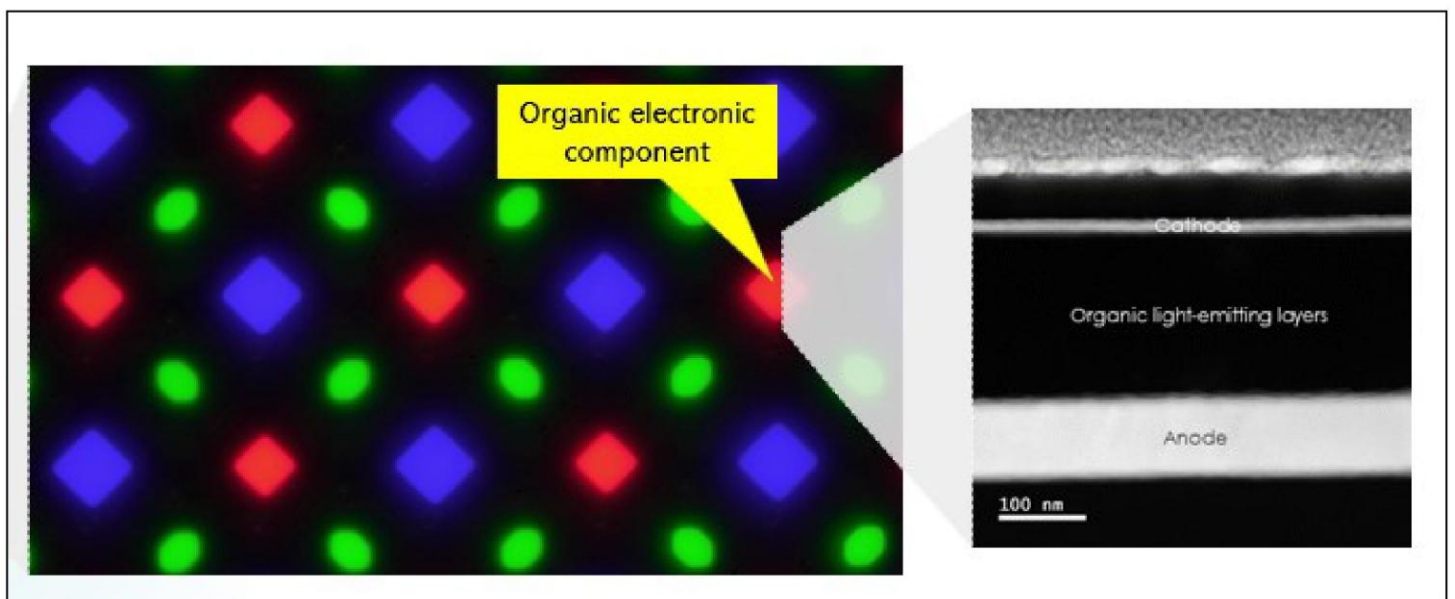
77 The Samsung Galaxy S23 has an OLED display.



Source: <https://www.samsung.com/ch/smartphones/galaxy-s23/>

78 “AMOLED” stands for “Active Matrix OLED.”

79 As is always the case with OLED displays, the OLED cells are arranged in the form of pixels on a carrier.



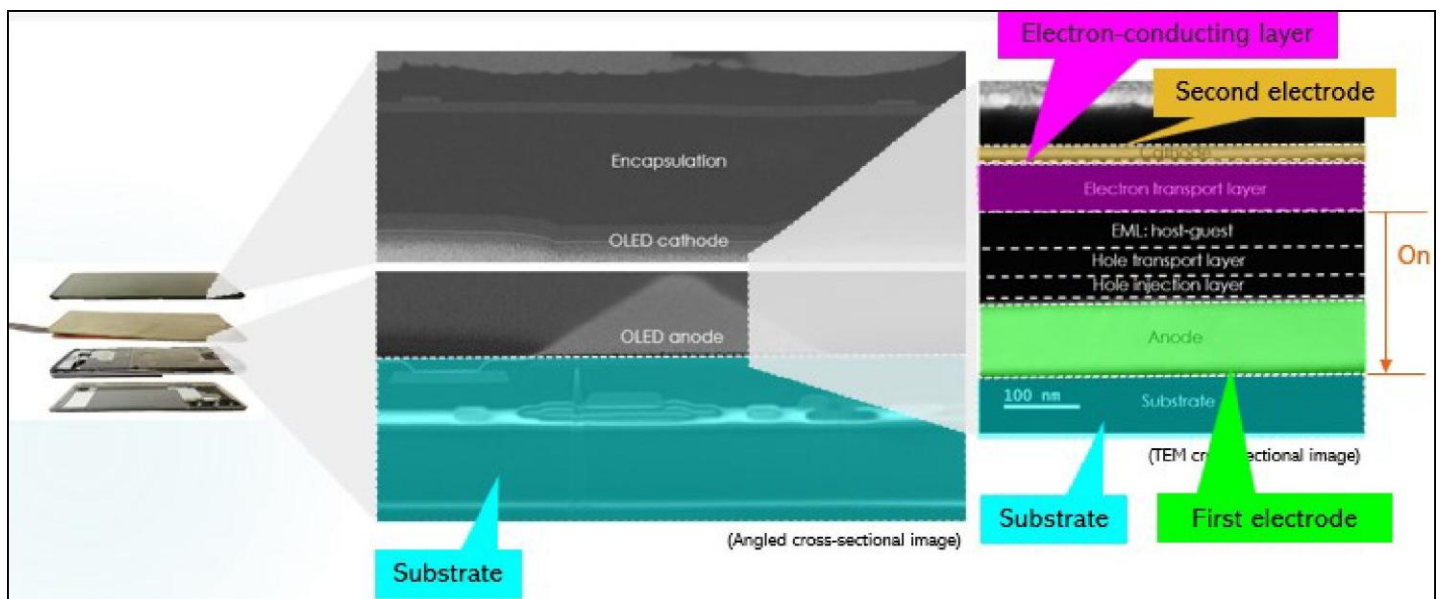
80 The OLED cells have the usual sandwich-like structure comprising

Anode
Organic layer
Cathode

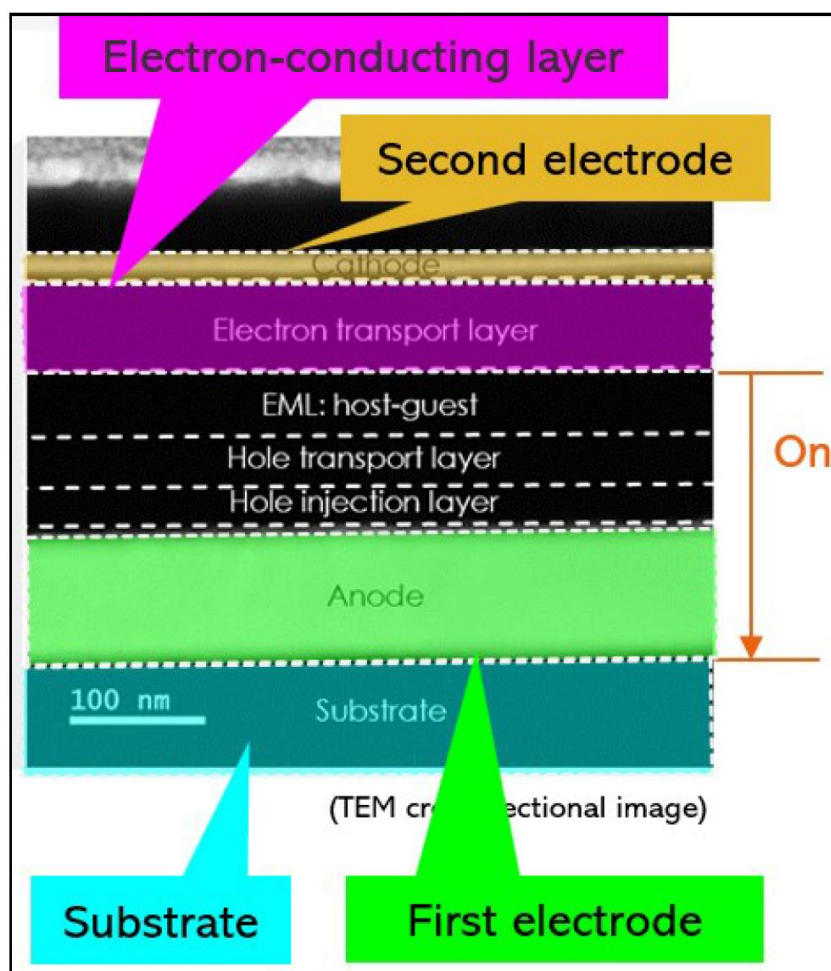
– or vice versa.

81 This structure is located on a carrier or substrate.

82 The organic layer between the anode (i.e., the first electrode) and the cathode (i.e., the second electrode) comprises a hole transport layer and an electron transport layer, as shown in the following image taken using a transmission electron microscope (“TEM”):



83 The right-hand section, for easier readability, is extracted again:



2. Feature 1 d) aa)

[The electron-conducting layer] is arranged such that it is electrically conductively connected to at least one of the electrodes,

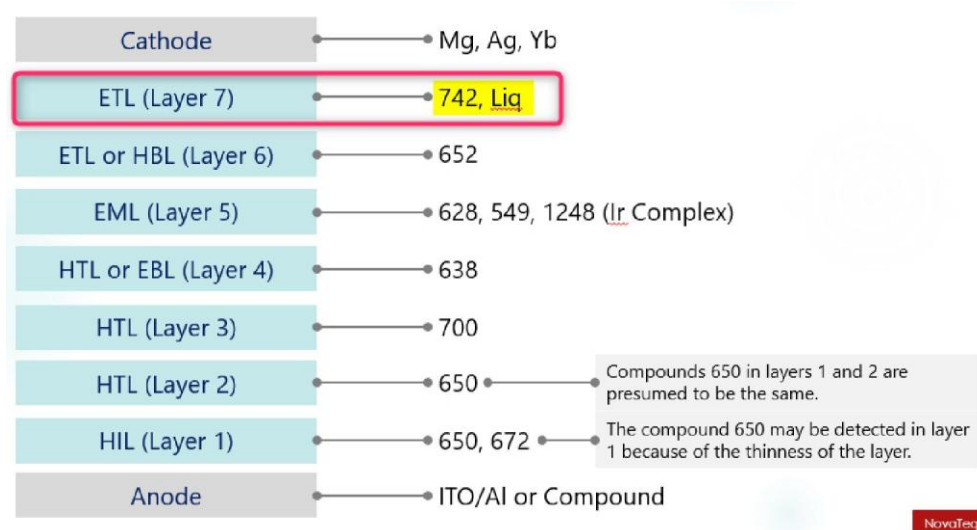
- 84 As shown above, the electron-conducting layer is connected to the cathode, which lies at the top in the image. In the depiction shown by Defendant 2 in para. 60, the electron-conducting layer consists of an electron transport layer (ETL) and an electron injection layer (EIL), with the EIL connecting the ETL to the cathode to facilitate better charge transfer. An EIL is typically extremely thin (0.5–1 nm) and therefore not visible in the above TEM image. Since the EIL is technically regarded as part of the ETL and is identified in para. [0063] as part of the electron-conducting layer, no separate treatment of the EIL will be provided below or in the investigation report.
- 85 The connection of the electron-conducting layer to the cathode is also an electrically conductive connection between the layers, because otherwise, electrons could not be introduced into the ETL.

3. Feature 1 d) bb)

[The electron-conducting layer] is obtained by co-evaporation of a metal complex, which comprises a metal central atom, with an organic compound.

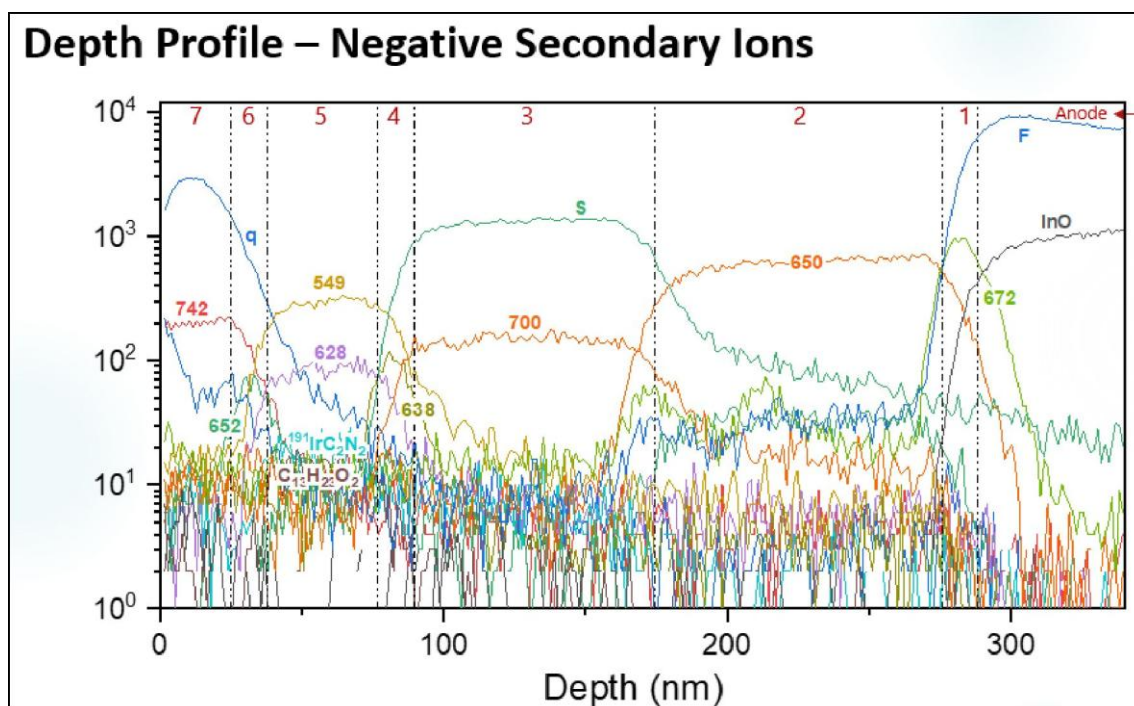
86 The examination of the OLEDs in the representative smartphone model from the Defendant, conducted by experts using the established time-of-flight secondary ion mass spectrometry (“ToF-SIMS”) technique described above, has shown that this claim feature is also met. We refer to the expert teardown report submitted as Exhibit PSKERW 11, which we will explain below.

87 In this particular case, it was shown that the electron-conducting layer (“ETL” = “Electron Transport Layer” = Layer 7 in the examined OLED) of the red pixel contains the organic compound $^{742}\text{C}_{52}\text{H}_{34}\text{N}_6$ (abbreviated as “742”) and the metal complex 8-quinolinolato lithium (“**Liq**”); see slide 16 of the investigation (Exhibit PSKERW 11; emphasis added):

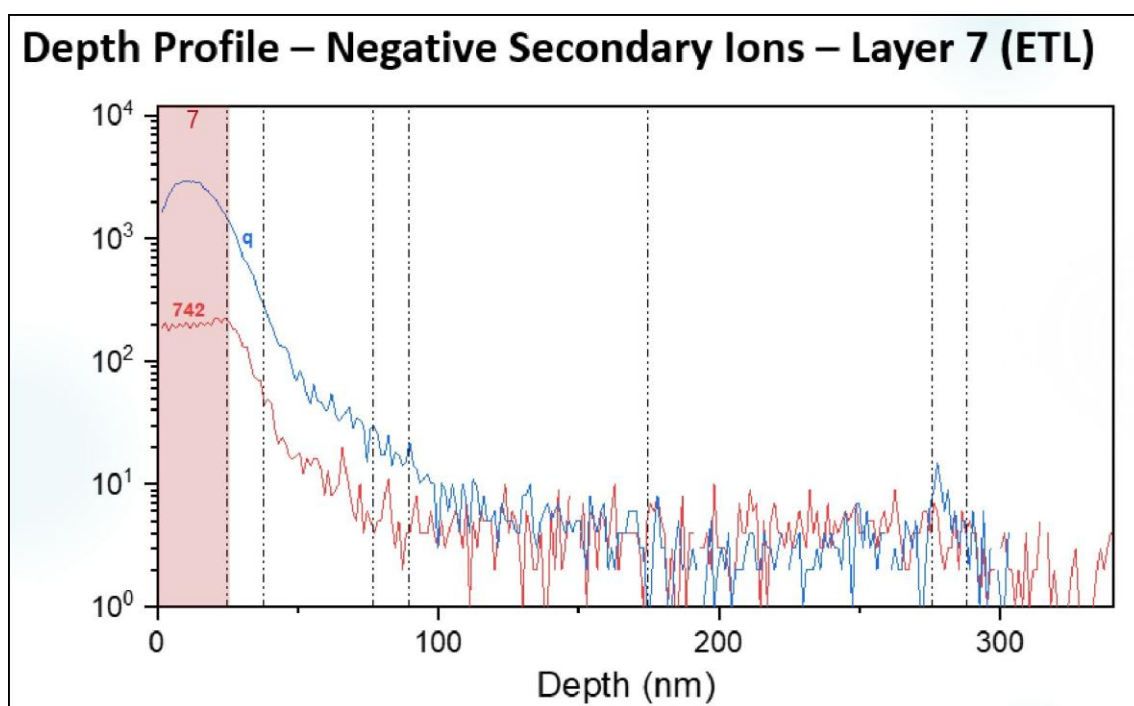


88 This follows from the measurement of the depth profile of this Layer 7. The results can be found on slides 12 and 14 of the teardown report, with slide 12 providing an overview of the measurements conducted using negative secondary ions and slide 14 showing the specific result relating to the electron transport layer (“ETL” / Layer 7).

89 Slide 12:

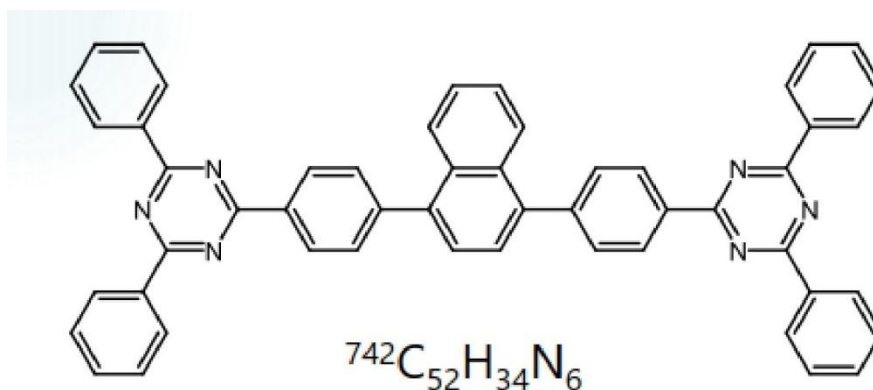


90 Slide 14:

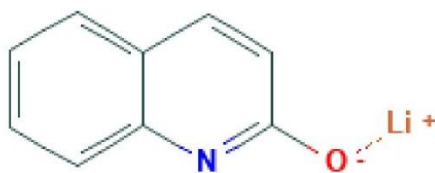


91 Regarding slides 12 and 14, it should be noted that the ordinate scale is logarithmic and signals around 10^1 merely represent statistical noise. The compounds **742** and **Li_q** (referred to on slides 12 and 14 without the lithium component as “**q**”) are therefore essentially present only in the electron transport layer (“ETL” / Layer 7).

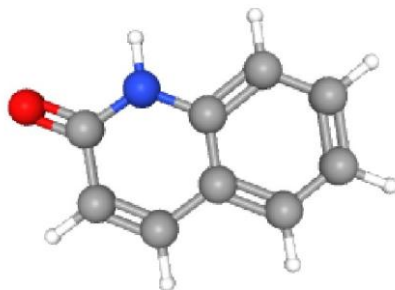
- 92 Furthermore, the chemical structure of these molecules was elucidated based on their mass and the detected fragmentation pattern of the molecules. Compound **742** corresponds to the molecular formula $C_{52}H_{34}N_6$. Based on the characteristic fragments of compound 742 that were found, the structure shown on slide 17 was assigned to the compound:



- 93 The characteristic fragments and their assignment to compound **742** are shown on slide 18. The red dashed lines indicate the cleavage sites where compound 742 broke apart, and the associated numbers represent the molecular weight of the corresponding fragment. If the number is placed to the left of the dashed line, it indicates the molecular weight of the fragment to the left of the cleavage site. If the number is placed to the right, it relates to the weight of the fragment to the right of the cleavage site, etc. Red numbers indicate that the corresponding fragment carried a charge and was detected in the mass spectrometer. A mass difference of 1 is ignored, as this difference almost always results from the extremely easy attachment or detachment of a hydrogen ion (H^+) from the molecule/fragment under mass spectrometry conditions. This is standard practice. Black numbers indicate that the fragment was either uncharged or too unstable and decayed further, and therefore could not be detected. The fragments labeled R^1 were used as shorthand to avoid writing out the remainder of molecule 742 (left-hand R^1) or the central portion of compound 742 between the two nitrogen-containing rings (right-hand R^1).
- 94 $^{742}C_{52}H_{34}N_6$ is an **organic** compound, as evidenced by the presence of carbon (C). It is frequently used in electron-conducting layers.
- 95 Furthermore, the compound lithium 8-quinolinolate (**Liq** or **q**), with the molecular formula C_9H_6LiNO , was also detected in the electron-conducting layer. It includes the elements carbon (C), hydrogen (H), nitrogen (N), oxygen (O), and lithium (Li). As it contains lithium – Li, a lightweight metal from the alkali metal group – C_9H_6LiNO constitutes a **metal complex**.



96 In 3D (including the outward-projecting hydrogen atoms):



97 Today, this metal complex is frequently used in OLEDs in the organic layer, often in the electron transport and injection layers – that is, in the components of the electron-conducting layer of the patent-in-suit. It is marketed and sold for this very purpose. An overview of the compound from PubChem of the NIH National Library of Medicine (https://pubchem.ncbi.nlm.nih.gov/compound/Quinolin-8-olato_lithium) is submitted as

– Exhibit PSKERW 12 –.

98 For example, *Tsubasa et al.*, “Unravelling the electron injection/transport mechanism in organic light-emitting diodes,” *Nature Communications* (2021) 12:2706, <https://www.nature.com/articles/s41467-021-23067-2.pdf>, discusses, among other topics, the mechanism of electron transport in OLEDs. In that article, the use of “Liq-doped ETL” is mentioned (p. 6, left column at the top). Similarly, *Tyagi et al.*, “Low voltage organic light emitting diode using p–i–n structure,” *Synthetic Metals*, Vol. 160, Issues 9–10, May 2010, pp. 1126–1129, <https://www.sciencedirect.com/science/article/abs/pii/S0379677910000834>:

Abstract

Efficient n-type doping has been achieved by doping Liq in electron transport material Alq₃. Detailed investigation of current density–voltage characteristics of electron only devices with different doping concentrations of Liq in Alq₃ has been performed. An increase in current density by two orders of magnitude has been achieved with 33wt% of Liq doped in Alq₃. Organic light emitting diode with p–i–n structure was fabricated using F₄-TCNQ doped α-NPD as hole transport layer, Ir(ppy)₃ doped CBP as emitting layer and 33wt% Liq doped Alq₃ as electron transport layer. Comparison of OLEDs fabricated using undoped Alq₃ and 33wt% Liq doped Alq₃ as electron transport layer shows reduction in turn on voltage from 5 to 2.5V and enhancement of power efficiency from 5.8 to 10.6lm/W at 5V.

- 99 Lithium 8-quinolinolate is commercially available, as noted, for example, on the website <https://www.americanelements.com/8-quinolinolato-lithium-25387-93-3>:

About (8-Quinolinolato)lithium

(8-Quinolinolato)lithium is one of numerous organometallic compounds sold by American Elements under the trade name AE Organometallics™. Organometallics are useful reagent, catalyst, and precursor materials with applications in thin film deposition, industrial chemistry, pharmaceuticals, LED manufacturing, and others. American Elements supplies (8-Quinolinolato)lithium in most volumes including bulk quantities and also can produce materials to customer specifications. Please request a quote above for more information on pricing and lead time.

The first two sentences read (emphasis added):

“(8-Quinolinolato)lithium is one of numerous organometallic compounds sold by American Elements under the trade name AE Organometallics™. Organometallics are useful reagent, catalyst, and precursor materials with applications in thin film deposition, industrial chemistry, pharmaceuticals, **LED manufacturing**, and others.”

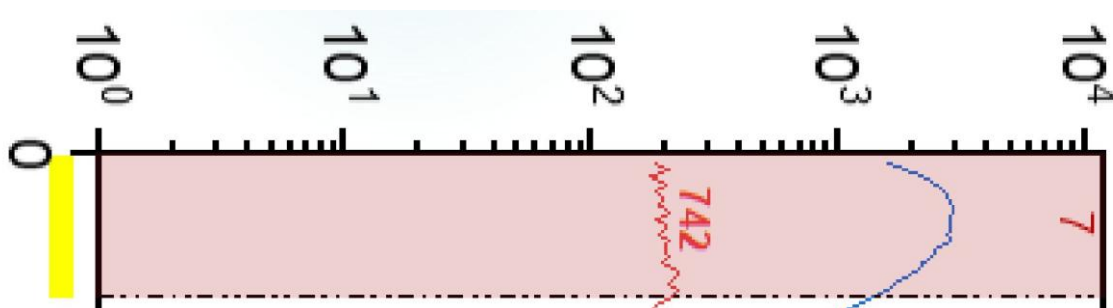
- 100 Where the blue label on slide 14 reads “q” (not “Liq”), this is because slide 14 presents measurements of negative secondary ions. While “q” as such carries a negative charge and is therefore detectable, the Liq metal complex cannot be detected under these measurement conditions because it is uncharged. However, it was detected during the measurement of positive secondary ions. Additionally, lithium ions were detected directly as lithium ion (denoted ⁷Li⁺), as well as a series of aggregates of Li and q (Li₂q, Liq₂, Li₃q₂, etc.) that formed under the mass spectrometry conditions due to lithium’s favorable complexation properties.

Evidence: Testimony of Mr. Jiang Liu, as above.

- 101 Regardless of which approach (positive or negative ions) was used, signals belonging to the combination of Liq and $^{742}\text{C}_{52}\text{H}_{34}\text{N}_6$ were detected – specifically, in such a way that they extend through the *entire* electron transport layer (ETL).

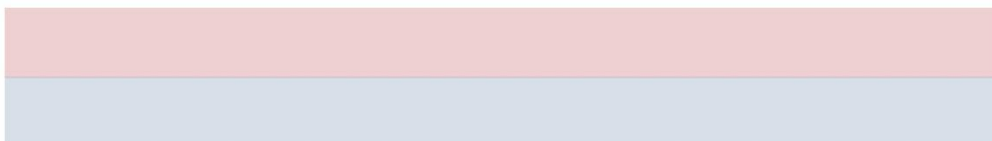
Evidence: Testimony of Mr. Jiang Liu, as above.

- 102 This aligns with the fact that in the OLED field, lithium 8-quinolinolate is typically used today as a dopant for the electron transport layer. This is done via **co-evaporation** with the host or carrier material of the dopant, in this case: the organic compound. Other methods that might be theoretically conceivable are not used in industrial manufacturing. To the extent that the examiner in the European proceedings concerning EP 2 342 772 expressed the view – concerning clarity, no less – that the compounds in the layer might also have been evaporated sequentially (i.e., not simultaneously), and that this would not be apparent from the product itself, these are inaccurate “paper” objections. They may have superficial appeal in theory but are, as any skilled person knows, incorrect in practice (among other reasons). As demonstrated by the investigations (see below), the observed result **rules out** that the two compounds were applied sequentially rather than together. For these reasons, the German examiner apparently had no objections.
- 103 In any case, the sole issue here is whether the contested embodiments meet the claim requirements. Laboratory testing has confirmed this. The depth profile measurement shows that both of the named elements are distributed across the *entire* layer thickness – not merely locally or at the edges. We show below the profile of Layer 7 from the depth profile introduced earlier (yellow marking added to indicate layer thickness; NB: the thickness is indicated in nanometers on the X-axis in the depiction, although in reality the layer is stacked vertically and must be imagined rotated 90° as follows):



- 104 Both the red curve (“742”) and the blue curve (“q”) extend through the entire layer. This tells the skilled person that the two elements were *co*-evaporated. During evaporation, the layer is built up gradually from bottom to top. If the two materials had been applied sequentially, *each* would be found only at a certain depth, and there would be peaks in

separate regions. A simplified representation of this alternative result would look like the following (red: ⁷⁴²C₅₂H₃₄N₆; blue: Liq):



Evidence: Testimony of Mr. Jiang Liu, as above.

- 105 This would be comparable to using two types of cake batter for a sponge base (e.g., a light and a dark batter): these can either be mixed together to form a light brown mass and a uniform, homogeneous cake base (corresponding to co-evaporation according to the claim), or baked separately and layered afterward, producing a cake base made up of one light and one dark layer (corresponding to sequential evaporation).
- 106 The conclusion shown on slide 14 by the experts based on the TOF-SIMS findings is based on the recognition that both ⁷⁴²C₅₂H₃₄N₆ and Liq are present across the full thickness of the layer.
- 107 Interim conclusion: Feature 1 d) bb) is proven.

4. Feature 1 d) bb) (1)

whereby through co-evaporation the organic compound is coordinated to the metal complex.

- 108 The presence of Li⁺ in Liq and of nitrogen (N) sites in the organic compound ⁷⁴²C₅₂H₃₄N₆ are structural features that enable coordination. Co-evaporation results in maximum proximity between the two molecules and allows orbital interaction, enabling the formation of coordinative bonds between the orbitals of the Liq complex and those of compound ⁷⁴²C₅₂H₃₄N₆. As shown in the examples of Patent-in-Suit 2 and described in para. [0034], no additional technical measure is needed beyond co-evaporation of the compounds – provided that the metal complex and the organic compound are suitable for forming coordination bonds. As shown above, this is true for lithium complexes. As also demonstrated earlier, nitrogen-containing organic compounds – and in particular hete-

rocyclic compounds with three nitrogen atoms, such as compound X of Patent-in-Suit 2 and compound $^{742}\text{C}_{52}\text{H}_{34}\text{N}_6$ in the contested embodiment – are suitable for forming coordination bonds with metal complexes. Accordingly, this feature is also fulfilled.

5. Result

109 The challenged embodiments literally infringe claim 1 of Patent-in-Suit 2.

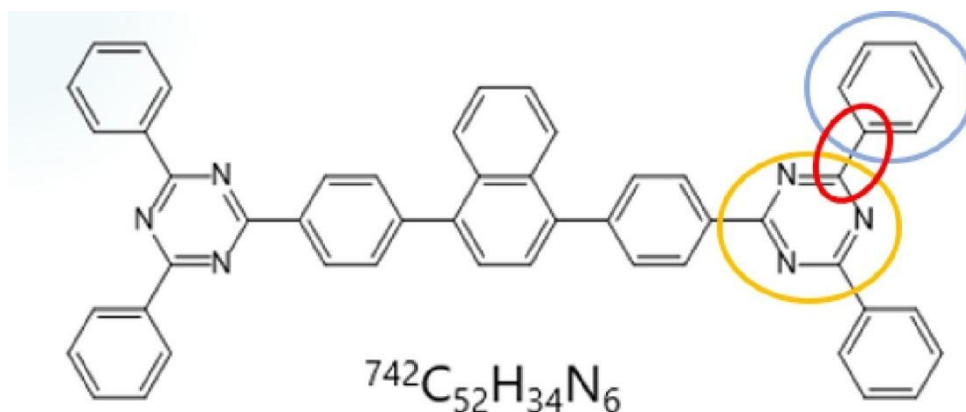
II. Dependent Claims of Claim 1

1. Dependent Claim 4

Organic electronic component according to any of the preceding claims, wherein the organic compound comprises a heteroaromatic that is conjugated via a C–C bond with an aromatic.

110 The organic molecule present in the electron transport layer exhibits the features of claim 4, and does so in multiple instances.

111 On the one hand, the molecule includes several aromatic groups in the form of six-membered rings. One of these aromatics is circled in blue below. In addition, the molecule has two heteroaromatic groups, again in the form of six-membered rings with three incorporated nitrogen atoms (N). One of these heteroaromatics is circled in yellow below. Finally, the aromatic and heteroaromatic rings are conjugated via a C–C bond (i.e., connected in such a way that a sequence of alternating single and double bonds extends across the aromatic and heteroaromatic systems). The C–C bond between the aromatic (blue) and heteroaromatic (yellow) rings is circled in red:



2. Dependent Claim 9

Organic electronic component according to any of the preceding claims, designed as an organic LED (OLED), which additionally comprises an organic emitting layer.

- 112 The Samsung Galaxy S23 has an OLED display, and OLEDs are defined by the fact that the emitter layer is made of organic material.

III. Independent Method Claim 15

- 113 The OLEDs used in the displays of the challenged mobile devices are, for the reasons stated above, direct products of the manufacturing process protected by claim 15. In particular, it was demonstrated in the examined Samsung Galaxy S23 Ultra that the deposition of the electron-conducting layer provided in step D was carried out by the simultaneous evaporation of a metal complex and an organic compound.

E. Legal Submissions

- 114 The expansion of the claim is expedient, as it concerns the same parties and the same technological context – namely OLED displays in Samsung mobile devices. Exemplary of the respective patent infringement in both cases is the Samsung Galaxy S23. The Plaintiff offers the Defendant group the opportunity to negotiate a global license on a portfolio that includes both patents-in-suit but extends far beyond them, under reasonable terms. Furthermore, the internal corporate cooperation between the two Defendants, as described in the complaint, is relevant to this expanded claim as well. Given that the hearing was only recently scheduled for December 18, 2024 – thus leaving more than 9½ months – there are ultimately no reasons of procedural economy or procedural fairness opposing the expansion, notwithstanding the possibility of severance.
- 115 The **local jurisdiction** of the Regional Court of Munich I arises from the fact that Defendant 1 actively promotes and markets the infringing mobile devices throughout Germany, including through its German websites, e.g. <https://www.samsung.com/de/computers/galaxy-book/galaxy-book3-pro/buy/>. Defendant 2 is aware – and actively furthers it for its own commercial interest – that the Samsung Group equips the contested embodiments with OLED displays manufactured by Defendant 2 and markets and sells them in Germany through Defendant 1, its local sales subsidiary. To that extent, Defendant 2 knowingly and intentionally collaborates with Defendant 1 in the latter’s acts of patent infringement in Germany. This applies both to the product protected under claim 1 (Section 9 sentence 2 no. 1 PatG) and the direct product of the process protected under claim 15 (Section 9 sentence 2 no. 3 PatG). The OLEDs in accordance with the patent-in-suit do not lose the characteristics gained through the manufacturing process by being installed – as intended – in the form of an OLED display in a mobile device.
- 116 This is a **patent litigation case**, for which the patent litigation chambers have functional jurisdiction pursuant to Section 143(1) PatG.
- 117 The infringing acts described above justify the requested **legal consequences**:
- 118 By offering, placing on the market, using, and possessing the contested smartphones for the aforementioned purposes in the Federal Republic of Germany, the Defendants unlawfully and directly use the technical teaching of Patent-in-Suit 2, such that they are obliged to **cease and desist** pursuant to Section 139(1) PatG in conjunction with Section 9 sentence 2 PatG.

- 119 Defendant 2, as the dedicated manufacturer of displays for, among other things, Samsung's portfolio of mobile devices, is aware that its displays are incorporated into final products that are distributed worldwide and in Germany as the most important European market. Its own commercial success is directly linked to this. If several companies undertake an infringing act in conscious and intentional cooperation, this constitutes **joint perpetratorship**. It is irrelevant that Defendant 2 does not deliver the displays it manufactures directly to Defendant 1 but instead supplies other Samsung Group companies.
- 120 In cross-border cases, a supplier based abroad is also jointly responsible for the infringement of domestic patent rights if it supplies the infringing devices with knowledge of the destination country and thereby knowingly and intentionally causes domestic distribution. These conditions apply to the specific business activities of Defendant 2 and its position within the Samsung Group. Defendant 2 cannot exculpate itself by claiming that it does not directly deliver the infringing displays to Defendant 1, but rather to another Samsung Group company outside of Germany. It is fully aware that the corresponding mobile devices and laptops are intended to be imported into the Federal Republic of Germany (where, as shown, it itself has a "sales office") for the purpose of distribution, and that they are marketed there by another Samsung subsidiary (cf. *Kühnen*, Handbuch der Patentverletzung [Manual of Patent Infringement], 15th ed., paras. 369 et seq.). In all of this, conditional intent – i.e., acceptance of the outcome – is sufficient.
- 121 Furthermore, the Defendants owe the Plaintiff **compensation** (Section 33 PatG) for the period since the publication of the patent application, and **damages** (Section 139(2) PatG) for the period from the publication of the notice of grant of Patent-in-Suit 2 (plus a one-month grace period in each case). As professional companies, they could have recognized the patent infringements by the challenged embodiments by exercising the due diligence required in commerce (Section 276 of the German Civil Code (BGB)). Insofar as the period prior to the Plaintiff's registration as proprietor is concerned, the Plaintiff is acting based on rights assigned by the previous owner, OSRAM OLED GmbH.
- 122 The precise **amount of damages** is currently unknown. However, since it is likely that the Plaintiff has suffered damage due to the Defendants' infringing acts and is not yet in a position to quantify the amount because it is, through no fault of its own, unaware of the extent of the acts of use and infringement, the Plaintiff has a legitimate legal interest in the determination of the Defendants' liability for damages in principle (Section 256 ZPO).
- 123 The claim for **third-party information** is based on Section 140b(1) PatG. Furthermore, to enable the Plaintiff to quantify its rightful claim for damages, the Defendants are obligated to render accounts to the extent requested (Sections 242, 259 BGB). The Plaintiff depends

on the disclosed information, which it does not possess through no fault of its own. Moreover, the information requested does not unreasonably burden the Defendants.

- 124 With application I.4, the Plaintiff asserts a **claim for destruction** (only) against the German Defendant 1. This claim is legally based on Section 140a PatG.
- 125 In addition, the Plaintiff is entitled under Section 140a(3) PatG to a **recall claim** for those infringing products that Defendant 1 has placed on the market since the grant of Patent-in-Suit 2. Such a recall claim exists independently of whether a potential injunction title already includes an obligation to recall (see *Kühnen*, Handbuch der Patentverletzung, 15th ed., Part D, para. 1009). If the challenged embodiments are no longer owned by the Defendants but are still held by commercial vendors such as electronics retailers (e.g., Saturn Hansa and MediaMarkt, cf. <https://www.saturn.de/de/brand/samsung/tablets-notebooks/galaxy-notebooks> and <https://www.mediamarkt.de/de/brand/samsung/tablets-notebooks/galaxy-notebooks>), then they are considered to be “in the distribution channels” within the meaning of the provision and must be removed from them. Corresponding claims for surrender may arise, for example, from legal warranty obligations, as typically provided for in supplier–customer contractual relationships.
- 126 The **partial securities** were determined using a common weighting between the claims. The setting of a partial security for a declaratory claim is unnecessary since it is not enforceable.

Electronically signed via beA

Dr. Thomas Adam
Attorney

Exhibits: PS_{KERW} 1 – PS_{KERW} 12