IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent of:	Brook & Whittle Limited
U.S. Patent No.:	11,961,422
Issue Date:	April 16, 2024
Appl. Serial No.:	18/103,234
Filing Date:	January 30, 2023
Title:	RECYCLABLE HEAT SHRINK FILM FOR RECYCLABLE CONTAINER

DECLARATION OF DR. MICHAEL DEIBLE

I, Dr. Michael Deible, declare that:

I. INTRODUCTION AND SCOPE OF WORK

1. I have been retained by Multi-Color Corporation ("Petitioner"), as an independent expert consultant in this post grant review ("PGR") proceeding before the United States Patent and Trademark Office.

2. I have been asked by Petitioner's Counsel ("Counsel") to consider whether certain references teach or suggest the features recited in Claims 1-19 of U.S. Patent No. 11,961,422 ("the '422 patent") (Ex. 1001). My opinions and the bases for my opinions are set forth below. My opinions are based on my education in chemistry and physical chemistry, as well as my work and research regarding material identification and characterization using multiple analytical methods and field sampling, as well as my work and research regarding analytical techniques such as GCMS, LCMS, FTIR, SEM, Raman, and TGA/DSC to analyze and classify materials.

3. In writing this Declaration, I have considered the following: the '422 patent, the prosecution history of the '422 patent, the prior art cited below, the materials discussed and referenced herein, and my own knowledge and experience, including my work experience in the fields described herein, and my experience of working with others in those fields during the relevant period.

4. I have no financial interest in either party or in the outcome of this proceeding. RJ Lee Group is being compensated for my work on an hourly basis for

all tasks involved and is being compensated at my standard consulting rate of $400 per hour for my services. My compensation is not dependent on the outcome of these proceeding or on any pending litigation, and my compensation is also not dependent on the content of my opinions. I have no direct financial interest in any of the parties associated with this matter.

II. QUALIFICATIONS

5. My *curriculum vitae*, which includes a more detailed summary of my background, experience, and publications, is attached as APPENDIX-A.

6. I earned a Ph.D. degree in Physical Chemistry from the University of Pittsburgh (2015), and a B.S. degree in Chemistry Education, from Indiana University of Pennsylvania (2008).

7. I presently serve as a Principal Investigator, RJ Lee Group, Pittsburgh PA, 2023-Present. I previously served as a Consulting Scientist, RJ Lee Group, Pittsburgh PA, 2017–2023, as well as an Assistant Professor, United States Military Academy, West Point NY, 2015–2017, as well as a Teacher, New Town High School, Baltimore, MD, 2008–2010, as well as a Laboratory Technician, Environmental Service Laboratories, Indiana, PA, 2007–2008, as well as with the Military Police, Pennsylvania Army National Guard, Baghdad, Iraq, 2004-2005.

8. I am an expert in the field of chemistry and physical chemistry, material identification and characterization, as well as use of multiple analytical methods for purposes of field sampling, including analytical techniques such as GCMS, LCMS, FTIR, SEM, Raman, and TGA/DSC to analyze and classify materials. As a result of my experience and frequent interaction with skilled artisans, I am familiar with the knowledge and understanding of a person of ordinary skill.

9. My findings, as explained below, are based on my education, experience, and background in the fields discussed above.

III. MATERIALS CONSIDERED

10. I have reviewed the ’422 patent (Ex. 1001) and relevant excerpts of its prosecution history (Ex. 1002). I have also reviewed the materials listed below and discussed and referenced herein:

- U.S. Patent No. 11,961,422 (Ex. 1001)
- The Prosecution History of the ’422 Patent (“the Prosecution History”) (Ex. 1002)
- Petitioner’s Gatorade Label (“Gatorade Label”) (Ex. 1003)
- Petitioner’s Febreze Label (“Febreze Label”) (Ex. 1004)
- PET-CG-02 – Critical Guidance protocol for clear PET articles with labels and closures (“PET-CG-02”) (Ex. 1005)

- PET-P-00 – PET Standard Laboratory Processing Practices ("PET-CG-00") (Ex. 1006)
- PET-S-04 – PET Package Materials Balance Test ("PET-S-04") (Ex. 1007)
- PET-S-01 – Labels for PET - Wash Water Test ("PET-S-01") (Ex. 1008)
- Shrink Sleeve Labels on PET Containers APR Resource Document ("APR-RES-LBL-2") (Ex. 1009)
- Evaluation of the Near Infrared (NIR) Sorting Potential of a Whole Plastic Article (SORT-B-01) (Ex. 1010)
- Evaluation of Sorting Potential for Plastic Articles Utilizing Metal, Metalized or Metallic Printed Components (SORT-B-03) (Ex. 1011)
- RD-TM-210-4 (Ex. 1012)
- Declaration of Mr. Craig Bushman (Ex. 1013)
- Declaration of Dr. Michael Deible (this Declaration) (Ex. 1014)
- ASTM D2732 (Ex. 1015)
- SKC inc. EL62 Product Description (Ex. 1016)
- Brook+Whittle webpage print, retrieved from https://brookandwhittle.com/recyclable-light-blocking-shrink-sleeves/ (Ex. 1017)
- Association of Plastic Recyclers recognition correspondence (Ex. 1018)
- Watson Standard Technical Data Sheet (Ex. 1019)

11. Although this Declaration refers to selected portions of the cited references for the sake of brevity, it should be understood that these are examples, and that one of ordinary skill in the art would have viewed the references cited herein in their entirety and in combination with other references cited herein or cited within the references themselves. The references used in this Declaration, therefore, should be viewed as being incorporated herein in their entireties. I have reviewed the entirety of the references themselves.

12. Counsel has informed me that I should consider these materials through the lens of a person of ordinary skill in the art ("POSITA") which is discussed further below, as of the effective date of the '422 patent, and I have done so. Unless otherwise stated, my testimony below refers to the knowledge of a POSITA as of the effective date.

IV. SUMMARY OF CONCLUSIONS

13. This Declaration explains the conclusions that I have formed based on my analysis. To summarize those conclusions:

- **GROUND 1:** Claims 1-3 and 5-19 are anticipated by the Gatorade Label. *See infra,* Section VIII.C.
- **GROUND 2:** Claim 4 is obvious in view of the Gatorade Label, including knowledge of a POSITA and Mitchell et al. (US 2017/0223879). *See infra*, Section VIII.D.

- **GROUND 3:** Claim 4 is obvious in view of the Gatorade Label and the Febreze Label. *See infra,* Section VIII.E.
- **GROUND 4:** Claims 1-19 are indefinite. *See infra,* Section VIII.F.

V. LEGAL PRINCIPLES

14. In forming my analysis and conclusions expressed in this Declaration, I have applied the legal principles described in the following paragraphs, which were provided to me by Counsel for the Petitioner.

A. Person of Ordinary Skill in the Art

15. I understand that the factors considered in determining the ordinary level of skill in a field of art include: the level of education and experience of persons working in the field; the types of problems encountered in the field; the teachings of the prior art regarding solutions to such problems; and the sophistication of the technology at the time of the alleged invention's effective filing date. I understand that a person of ordinary skill in the art ("POSITA") is not a specific real individual, but rather is a hypothetical individual having the qualities reflected by the factors above and knowledge of all relevant prior art references, including the references I cite in my analysis below. For the purposes of this declaration, the field to which I am referring is materials characterization, analysis, and identification as it relates to label construction.

B. Anticipation

16. I have been informed that a patent claim is anticipated if a single

reference discloses all of the elements of the claim within the four corners of the reference, and also discloses those elements as arranged in the claim.

C. Obviousness

17. I have been informed that a patent claim is invalid as "obvious" under 35 U.S.C. § 103 in light of one or more prior art references if it would have been obvious to a POSITA, taking into account (1) the scope and content of the prior art, (2) the differences between the prior art and the claims, (3) the level of ordinary skill in the art, and (4) any so called "secondary considerations" of non-obviousness, which include: (i) "long felt need" for the claimed invention, (ii) commercial success attributable to the claimed invention, (iii) unexpected results of the claimed invention, and (iv) "copying" of the claimed invention by others.

18. I have been informed that a claim can be obvious in light of a single prior art reference or multiple prior art references. To be obvious in light of a single prior art reference or multiple prior art references, there must be a reason to modify the single prior art reference, or combine two or more references, in order to achieve the claimed invention. This reason may come from a teaching, suggestion, or motivation to combine, or may come from the reference or references themselves, the knowledge or "common sense" of one skilled in the art, or from the nature of the problem to be solved, and may be explicit or implicit from the prior art as a whole. I have been informed that the combination of familiar elements according to known methods is

likely to be obvious when it does no more than yield predictable results. I also understand it is improper to rely on hindsight in making the obviousness determination.

19. I understand that an obviousness determination also requires that a POSITA would have had a reasonable expectation of success. This concept has been explained to me as relating to the relative likelihood or predictability - from the perspective of a POSITA - of successfully supplementing and/or modifying the prior art in a manner that would meet the claimed limitations of the patent being challenged (here the ’422 patent). I understand that the expectation of success need only be “reasonable” and, thus, does not require the absolute certainty gleaned from physically creating the proposed prior art modification.

D. Indefiniteness

20. It is my understanding that in a post-grant proceeding, a claim is invalid for indefiniteness if, when read in light of the specification delineating the patent and the prosecution history, it fails to inform, with reasonable certainty, those skilled in the art about the scope of the invention.

E. Claim Construction Standard

21. It is my understanding that the claim construction standard includes construing the claim in accordance with the ordinary and customary meaning of such claim as understood by a person of ordinary skill in the art. As explained

above, I was at least a person of ordinary skill in the art before the earliest filing date of the challenged patent.

22. I understand that in a post-grant review proceeding, claims are interpreted under the same construction standard that is used in a United States federal court. I understand that, for purposes of my analysis in this post-grant review proceeding, the meaning of terms appearing in the patent claims should be interpreted from the viewpoint of a POSITA at the time of the alleged invention. I further understand that the words of the claims are generally given their ordinary and customary meaning as understood by one of ordinary skill in the art in light of the specification and prosecution history pertaining to the patent. I understand, however, that claim terms are generally not limited by the embodiments described in the specification.

23. I have used the earliest priority date of the ’422 patent as the point in time for claim interpretation purposes. I understand that date was May 13, 2022, based on the face of the ‘422 patent and its indication that the patent application that issued as the ‘422 patent is a continuation of a patent application filed on May 13, 2022. Still, I note that if the priority date were different by less than two years, my analysis would not be impacted.

VI. PERSON OF ORDINARY SKILL IN THE ART

A. A POSITA's Ordinary Level of Skill

24. Based on my knowledge and experience in the field of material analysis and identification as it relates to label construction and my review of the '422 patent and its file history, I believe that a person of ordinary skill in the art ("POSITA") would have had at least (1) a Bachelor's degree in chemistry or a related field, with (2) 5 years of experience in material identification and characterization using multiple analytical methods and field sampling, or equivalent research or professional experience. Additional graduate education could substitute for years of experience, or significant experience in the field could substitute for formal education.

25. Accordingly, my analysis and conclusions expressed in this Declaration are based on the perspective of a POSITA having this level of knowledge and skill. My education, technical expertise, and personal knowledge discussed above demonstrates that I meet and exceed the qualifications of a POSITA. In addition, as indicated herein, I have considered and relied upon the Declaration of Mr. Craig Bushman, who I understand has experience in, among other fields, labels and the design and manufacturing of labels.

B. A POSITA's Background Knowledge

1. Background of the technology

26. As I will explain in more detail below, the '422 patent's inventors claim to have invented, and the two independent claims of the '422 patent, *i.e.*, claims 1 and 19, claim a heat shrink label comprising a heat shrink film of polyethylene terephthalate (PET) that is recyclable with a PET container and includes a light blocking layer. The '422 patent describes this as follows:

> A recyclable shrink label includes a heat shrink film having a first surface and a second surface opposite of the first surface; and a light blocking layer disposed adjacent the first surface and comprising a light blocking component, the light blocking layer being constructed for the recyclable shrink label to block at least 80% of incident light having wavelengths in a range of 200 nm to 900 nm. The recyclable shrink label may further include an indicia layer. The recyclable shrink label may further include a high opacity layer. The recyclable shrink label may be applied to a container, e.g., a recyclable container. Articles including the recyclable shrink label may be recycled in a process where both the container and the label are recognized as a resin and may be directed into a corresponding recycling stream. In some cases, both the container and the label include PET.

Ex. 1001, Abstract.

27. But the inventors are mistaken. This technology was not new or inventive. Indeed, as explained below, before the earliest priority date of the '422 patent, such labels had been conceived and manufactured, and offered for sale and sold.

28. I have cited numerous documents and industrially relevant methods produced by a consensus body throughout this declaration that support my understanding, each of them preceding the '422 patent. A POSITA would have known of these references and considered them representative examples regarding the

state of the art. Accordingly, my analysis below in Section VIII is informed by these references, as well as my personal knowledge and experience. In the limited situations in which I may cite to a reference that postdates the earliest priority date of the '422 patent, the reference adds context of well-known principles or ideas that were known prior to the earliest priority date of the '422 patent.

2. The known nature of recyclable packaging

29. Recyclable packaging has been known for decades. The '422 patent specification acknowledges as Background to the purported invention that "the consumer packaged-goods markets globally aspire to utilize recyclable packaging for most products." The '422 patent provides an example of that known recyclable packaging as "…PET packaging," which "provides a cost effective recyclable option." Ex. 1001, at 1:14-23.

3. The known nature of light protective packaging

30. The '422 patent specification acknowledges that the market has required light protective packaging, so as to block light waves that are harmful to ingredients. Ex. 1001, at 1:14-23. That is because harmful light waves are known to impact the shelf life and performance of those products. *Id.*

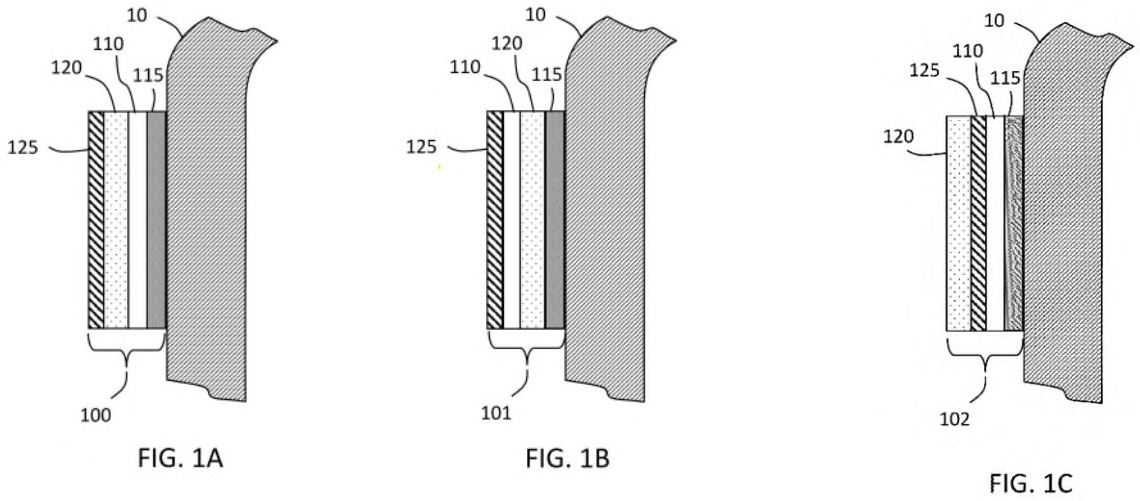
4. The known use of shrink films to provide light blocking

31. According to the ’422 patent specification, “shrink films printed with…light blocking layers” have been “traditionally” used in order to block light waves that are harmful to ingredients. Ex. 1001, at 1:14-23.

VII. OVERVIEW OF THE ’422 PATENT

A. The ’422 Patent

32. The ’422 patent is directed to “[a] recyclable shrink label” that includes “a light blocking layer.” Ex. 1001, Abstract. The light blocking layer comprises a light blocking component that is constructed “to block at least 80% of incident light having wavelengths in a range of 200 nm to 900 nm.” *Id.*



Ex. 1001, Fig. 1A and 1B and 1C

33. The ’422 patent describes different embodiments of the recyclable shrink label, including with respect to the layers of the label. For example, Figure 1A (reproduced above) shows an article 10 (*e.g.*, a bottle or other container) having

a heat shrink label 100 applied on its outside surface. Ex. 1001, at 17:24-33. The heat shrink label 100 includes a heat shrink film 120, upon which indicia layer 125 (e.g., graphics) is disposed on one surface thereof. *Id.* An opposing surface includes a high opacity layer 110, and a light blocking layer 115, on the high opacity layer 110. *Id.*

34. Fig. 1B shows an alternative embodiment. In Fig. 1B, the article 10 (*e.g.*, a bottle or other container) has a heat shrink label 101 applied on its outside surface. Ex. 1001, at 17:34-42. The heat shrink label 101 includes a heat shrink film 120, upon which a light blocking layer 115 is disposed on one surface and an opposing surface having a high opacity layer 110. *Id.* Disposed on the surface of the high opacity layer 110 opposite the heat shrink film 120 is an indicia layer 125. *Id.*

35. Fig. 1C shows yet another alternative embodiment. In Fig. 1C, an article 10 (*e.g.*, a bottle or other container) having a heat shrink label 102 applied on its outside surface. Ex. 1001, at 17:43-51. The heat shrink label 102 includes a heat shrink film 120, upon which an indicia layer 125 is disposed on its surface, a high opacity layer 110 is disposed on the surface of the indicia layer 125. *Id.* A light blocking layer 115 is disposed on the high opacity layer 110. *Id.*

B. The Prosecution History of the ’422 Patent

36. The inventors of the ’422 patent purport to have invented a recyclable shrink label that includes a light blocking layer constructed to block at least 80% of

incident light having wavelengths in a range of 200 nm to 900 nm. For example, claim 1 recites "[a] recyclable shrink label comprising: a heat shrink film having a first surface and a second surface opposite of the first surface, the heat shrink film having a thickness from 15 μm to 100 μm; and a light blocking layer disposed adjacent the first surface and comprising a light blocking component, the light blocking layer being constructed for the recyclable shrink label to block at least 80% of incident light having wavelengths in a range of 200 nm to 900 nm." Ex. 1001, at 28:21-37.

37. In issuing the '422 patent, the USPTO did not have before it a heat shrink label that had been commercially available or offered for sale and sold before the priority date. For example, Petitioner's Gatorade Label was offered for sale and sold before the priority date, but that was not presented for consideration by the Patent Examiner. Petitioner's Gatorade Label (Ex. 1003) is a recyclable shrink label, and includes a light blocking layer. And, as explained below, Petitioner's Gatorade Label meets or renders obvious all of the claim limitations of the claims of the '422 patent. As another example, Petitioner's Febreze Label (Ex. 1004) was offered for sale and sold before the priority date, but that was not presented for consideration by the Patent Examiner. Ex. 1002.

38. The fact that Petitioner's Gatorade Label, a recyclable shrink label with a light blocking layer, was offered for sale and sold before the priority date of the '422

patent, should not be any surprise given the market forces acknowledged by the ’422 patent. That is, it should be no surprise that Petitioner’s Gatorade Label was offered for sale and sold in light of the undisputed fact that recyclable packaging has been known for decades. Ex. 1013, at ¶36. In addition, the market has required light protective packaging, so as to block light waves that are harmful to ingredients, and that “shrink films printed with…light blocking layers” have been “traditionally” used in order to block light waves that are harmful to ingredient.” Ex. 1001, at 1:14-23. In this regard, the scope and content of the prior art (Gatorade Label) is extremely broad and close to the claims of the ‘422 patent, such that there is little difference between the prior art and the claims.

39. For similar reasons, it is my opinion that the fact that Petitioner’s Febreze Label, a shrink label with a light blocking layer, was offered for sale and sold before the priority date of the ’422 patent, should not be any surprise given the market forces acknowledged by the ’422 patent. Ex. 1013, at ¶37. As noted above, the market has required light protective packaging, so as to block light waves that are harmful to ingredients, and that “shrink films printed with…light blocking layers” have been “traditionally” used in order to block light waves that are harmful to ingredient.” Ex. 1001, at 1:14-23. Again, in this regard, the scope and content of the prior art (Febreze Label) is extremely broad and close to the claims of the ‘422 patent, such that there is little difference between the prior art and the claims.

40. Patent Owner filed the ‘422 patent as U.S. Patent Application No. 18/103,234 (the “‘234 application”) on January 30, 2023. Ex. 1001, at 1. Patent Owner claimed priority to a Continuation of Application No. PCT/US2022/029280, filed on May 13, 2022. *Id.* Patent Owner then submitted an Information Disclosure Statement, also January 30, 2023, citing an Association of Plastic Recyclers resource documents, benchmark evaluation document, protocol document, evaluation documents, and a PCT Search Report associated with Application No. PCT/US2022/029280. Ex. 1002, at 92-93.

41. Concurrently with filing the application, Patent Owner filed a Track One Request for prioritized examination under 37 C.F.R. §102(e)(1). *Id.* at 139. The Request for prioritized examination was granted on March 22, 2023. *Id.* at 204.

42. On August 9, 2023, the Examiner issued an Office Action citing additional references, including Mitchell et al. (US 2017/0223879), and making rejections including under 35 U.S.C. §103. Ex. 1002, at 221-243. The Examiner determined that the term “recyclable” is considered functional language and does not further limit the structure. *Id.* at 229. The Examiner also determined that Mitchell teaches “that the shrinkable labels provide easy separate (sic) during recycling process.” *Id.*

43. In connection with the August 9, 2023 Office Action, the Examiner also cited Mitchell et al. (US 2017/0223879), noting that it “teaches that the metallization

layer can be provided on either of the skin layers ([0101-0106]). It would have been obvious to one of ordinary skill in the art before the effective filing date of the claimed invention to provide the metallization layer (high opacity layer) such that it is positioned between the printing (indicia layer) and the third layer/skin (7; light blocking layer) to ensure the printing is visible and provide (sic) a metallic look to the label." *Id.* at 239.

44. Applicant conducted an Examiner Interview on October 13, 2023. *Id.* at 333. As summarized by Applicant, "[p]otential claim amendments and differences between claims and the prior art were discussed." *Id.*

45. As summarized in the Applicant-Initiated Interview Summary, "[n]o agreement regarding allowability was reached during the interview." *Id.* at 344.

46. Applicant filed an Amendment in response to the Office Action on October 16, 2023. *Id.* at 333-341. Among other amendments, Applicant amended application claim 1 to incorporate the limitation "wherein the recyclable shrink label is recyclable with a PET container." *Id.* at 336.

47. In connection with the above-referenced Amendment, Applicant made the following arguments: "The shrink labels taught by Mitchell '879 are not made of PET and would not be recyclable with a PET container. Labels made of other materials, including polypropylene, polyethylene, and paper, are considered contaminants in a PET recycling stream and need to be removed for the PET container

to be recycled. This is supported by a Resource Documents by the Association of Plastic Recyclers (APR), provided herewith. The APR document states: 'APR recommends films that are compatible with PET recycling such as: 1. Films that float in water and that can be separated from PET that sinks in water, or, 2. PET based films that crystallize and can be recovered with the PET stream.'" *Id.* at 336.

48. Also in connection with the above-referenced Amendment, Applicant made arguments with respect to Mitchell and that "the label becomes unrecyclable", including that [a]n important consideration for inks on shrink sleeve labels is that the ink no contaminate or discolor PET flake when mixed in hot caustic wash water used in the recycling process…. Even if the label in Mitchell '879 was otherwise capable of being recycled, the pigments being incorporated into the core layer polymer would contaminate the polymer flake during the recycling process." *Id.* at 337. Applicant also argued that "[i]n contrast, the present application teaches that the inks and pigments used in the recyclable shrink label may be removed by washing, leaving behind a label that can be recycled with the article." *Id.*

49. In connection with the above-referenced Amendment, Applicant did not respond to or dispute the Examiner's citation of Mitchell et al. (US 2017/0223879) or determination that it "teaches that the metallization layer can be provided on either of the skin layers ([0101-0106]). It would have been obvious to one of ordinary skill in the art before the effective filing date of the claimed invention to provide the

metallization layer (high opacity layer) such that it is positioned between the printing (indicia layer) and the third layer/skin (7; light blocking layer) to ensure the printing is visible and provide (sic) a metallic look to the label." *Id.* at 333-341.

50. In connection with a November 13, 2023 Office Action, the Examiner similarly cited Mitchell et al. (US 2017/0223879) in connection with Sasaki et al. (JP2009-214535A), noting that "[i]t would have been obvious to one of ordinary skill in the art before the effective filing date of the claimed invention, to modify the light shielding shrink film (recyclable shrink label) taught by Sasaki et al. to further include the core layer comprising a titanium dioxide pigment between the indicia layer and the crystalline polymer film (light blocking layer) to provide opacity to the overall light shielding shrink film (recyclable shrink label)." *Id.* at 354.

51. Applicant filed an Amendment in response to the Office Action on January 10, 2024. *Id.* at 408-413. Among other amendments, Applicant amended application claim 1 "to include the subject matter of application claim 12….". *Id.* at 418.

52. A Notice of Allowance was mailed on February 6, 2024. Ex. 1002, at 430. Applicant's arguments made in connection with the January 10, 2024 Amendment were considered persuasive. *Id.* at 434.

53. As I explain below, the claimed features (as well as other features indicated as allowable by the USPTO), were well-known by persons of skill in the art

at the time of the patent and its earliest priority date, and further are taught by the Gatorade Label, and the combination of the Gatorade Label and the Febreze Label.

VIII. APPLICATION OF PRIOR ART TO THE CHALLENGED CLAIMS

A. Overview of the Grounds

54. Below I will explain each of the grounds fully. The grounds are summarized in the following table for ease of reference:

Ground	Claims	Basis
1	1-3, 5-19	§102 – Gatorade Label
2	4	§103 – Gatorade Label and Knowledge of a POSITA, including Mitchell et al. (US 2017/0223879)
3	4	§103 – Gatorade Label in view of the Febreze Label
4	1-19	§112 – Indefiniteness

B. References Appearing in the Grounds

55. As I understand, each reference relied on in the above grounds pre-dates the Critical Date of the '422 patent and qualifies as prior art based on its filing date and/or publication date according to the below table. I am relying upon the Declaration of Mr. Craig Bushman (Ex. 1013, at ¶¶43-57) relating to relevant dates and the respective qualification of the art as prior art, including the disclosed dates relevant to the Gatorade Label and the Febreze Label.

Reference	Public Date	Prior Art Under
Gatorade Label (Ex. 1003)	At least in 2020 (See Ex. 1012, at ¶¶43-57)	§102(a)(1)
Febreze Label (Ex. 1004)	At least in 2018 (See Ex. 1012, at ¶¶43-57)	§102(a)(1)
Mitchell et al. (US 2017/0223879)	Published August 3, 2017	§102(a)(2)

C. GROUND 1: THE GATORADE LABEL ANTICIPATES CLAIMS 1-3 AND 5-19

56. Ground 1 presents that the Gatorade Label anticipates claims 1-3 and 5-19 under §102.

1. Overview of the Gatorade Label (Ex. 1003)

57. The Gatorade Label is a shrink sleeve label that is recyclable with a PET container. Ex. 1013, at ¶44. It is a PET film and a washable ink system designed to meet the requirements of recyclability per the APR. *Id.* It includes light blocking features (including ink layers of metal particulates, and including aluminum and titanium dioxide for the silver and white ink). *Id.*

58. The Gatorade Label was produced and sold publicly in 2020, in substantial quantities. Ex. 1013, at ¶¶45-46.

2. Element-by-Element Analysis

[Claim 1] A recyclable shrink label comprising: a heat shrink film comprising polyethylene terephthalate (PET)…:

59. Based on discussions with Craig Bushman of Multi-Color, I understand that the Gatorade Label and the Febreze Label are heat shrink labels. Ex. 1013, at ¶¶44-51. My analysis herein confirms this.

60. To confirm that each sample is composed of PET, clear portions of samples 3191157, 3191167, and 3191176 were sectioned and analyzed via Fourier

Transform Infrared Spectroscopy (FTIR) using a Brucker Tensor 37 with a Hyperion microscope attachment. Samples were analyzed using the Attenuated Total Reflection (ATR) attachment on the Hyperion microscope, where a germanium tipped ATR lens is pressed into the film for analysis.

61. As can be seen in Figures 2 and 3, each film is consistent with an internal PET standard measured on the same instrument as well as a PET standard from the Wiley KnowItAll Library. As can be seen, all samples are consistent with PET.

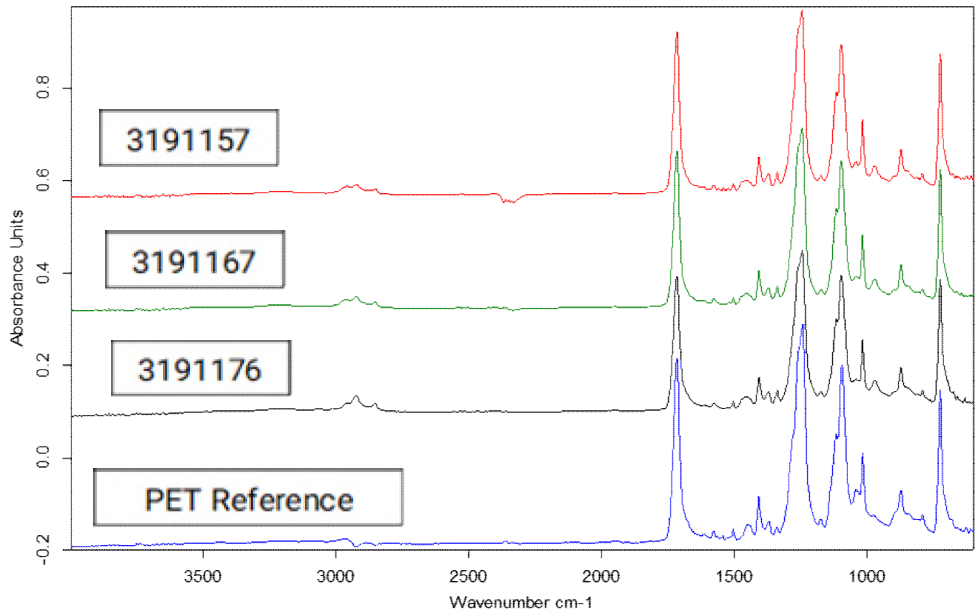


Figure 2. FTIR analysis of 3191157 (red spectra, top), 3191167 (green spectra), 3191176 (black spectra), and an internal PET standard (blue spectra, bottom).

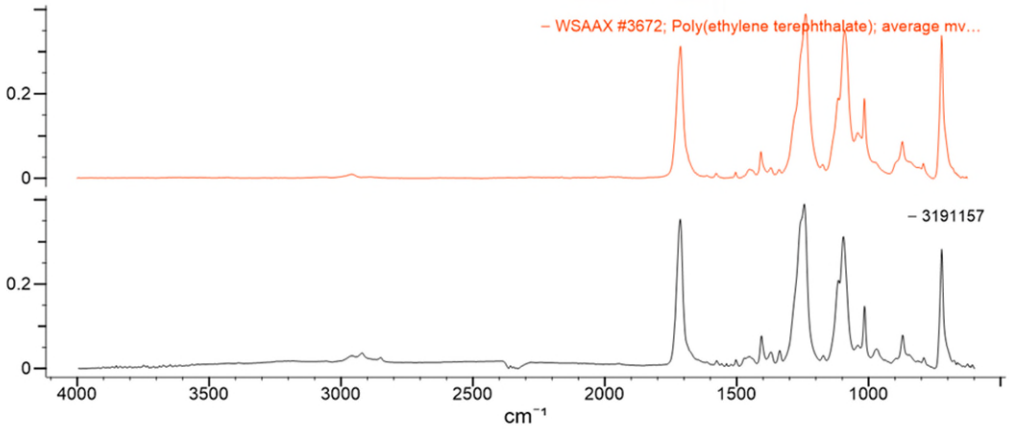


Figure 3. Comparison of representative FTIR analysis of 3191157 (black spectra) to a reference spectra matched to the Wiley KnowItAll library.

[Claim 1 (cont.)] …and having a first surface and a second surface opposite of the first surface, the heat shrink film having a thickness from 15 µm to 100 µm;…

62. To show layer thickness, cross sections from samples 3191115, 3191157, 3191167, and 3191176 were prepared. Samples were taken from each label at a location as can be seen in Figure 4.

Figure 4. Location of each cross section taken from 3191115, 3191157, 3191167, and 3191176.

Figure 4 (cont). Location of each cross section taken from 3191115, 3191157, 3191167, and 3191176.

63. To prepare cross sections, samples were mounted on carbon tape between two glass slides and cut with a fresh stainless steel knife. All cross sections were then carbon coated and imaged and analyzed via SEM using a Tescan Mira as can be seen in Figure 5a – 5d. (See APPENDIX B). All images are parallel to the line of the seam.

64. As can be seen, all samples have a heat shrink PET film thickness of approximately 40-60 microns.

[Claim 1 (cont.)] …and a light blocking layer disposed adjacent the first surface and comprising a light blocking component…

65. The light blocking component was determined using SEM-EDS analysis. EDS analysis is conducted with a Bruker EDS attached to a Tescan Mira SEM. As can be seen in Figure 6, the light blocking component of each layer is consistent with aluminum.

66. For sample 3191115, the light blocking layer is adjacent to the substrate consistent with Figure 1C of the ‘422 patent. For samples 3191157, 3191167, and 3191176, the aluminum light blocking layer is between the PET layer and the high opacity layer. (See APPENDIX B).

[Claim 1 (cont.)] …the light blocking layer being constructed for the recyclable shrink label to block at least 80% of incident light having wavelengths in a range of 200 nm to 900 nm…,

67. To measure light blocking ability, samples were analyzed using a Shimadzu 2600i with an integrating sphere. The integrating sphere is coated with barium sulphate and the lowest wavelength that can be measured is 220 nm. This is the same instrument used in the description of light blocking in column 13 line 47 of the ‘422 patent.

68. As noted in line 43 of column 13 and in the later examples, 220 nm was used as a minimum for the wavelength measurements with the Shimadzu 2600i. Ex. 1001, at 13:43. A portion of each sample 3191115, 3191158, 3191168, and 3191171 was placed in a sample holder between the radiation source and integrating sphere for analysis.

69. Percent Transmittance results can be seen in Figure 7. All samples block at least 80% of light in the 220 to 900 nm range.

[Claim 1 (cont.)] wherein the light blocking component comprises a particulate having a particle size of 0.1 µm to 100 µm, wherein the particulate comprises metal, metal oxide, a reflective pigment, carbon black, mica, or a combination thereof…

70. The primary light blocking component of the light blocking layer is aluminum, as seen in Figure 6. As can be seen in Figure 5, the aluminum flakes have a thickness larger than 0.1 µm and less than 100 µm. (See APPENDIX B).

[Claim 1 (cont.)] …and where in the recyclable shrink label is recyclable with a PET container.

71. To determine if a label is recyclable with a PET container, laboratory tests were conducted in reference to the disclosures in the '422 patent (Ex. 1001, at 6:61-64; 11:29-53) and RD-TM-210-4 (Ex. 1012). For example, the '422 patent states in column 6 line 61 that a label is "…considered recyclable if no inks are retained on the film after a caustic wash cycle typically used in PET reclaiming processes." Lab scale testing was conducted as follows.

72. A portion of samples 3191115, 3191157, 3191167, and 3191176 were preshrunk as is represented in Figure 8. (See APPENDIX B). Each sample was then cut into approximately 1 cm^2 pieces using stainless steel scissors. PET flakes were created by cutting generic store bought single use water bottles into approximately 1 cm^2 pieces using stainless steel scissors. Representative photos can be seen in Figure 9. (See APPENDIX B).

73. Then, 500 mL of caustic wash solution was made by dissolving 5 grams of sodium hydroxide in 498.5 mL water. 1.5 mL of Triton X100 was added to the solution.

74. 40mL of the caustic wash solution was heated in a beaker to approximately 85 ^{o}C on a hot plate with a Teflon stir bar. 0.15 grams of preshrunk label flakes were mixed with 5 grams of PET flakes, as can be seen in Figure 9. The mixture was then placed in the beaker for approximately 15 minutes.

75. After this time, the sample was removed from heat and allowed to stand for 5 minutes. It was then filtered using a 10 mesh (2 mm) stainless steel sieve and the caustic wash water was collected. 40 mL of water was then heated to approximately 45 ^{o}C, and the flake mixture was added to this water for 5 minutes.

76. After this time the sample was removed from heat and allowed to stand for 5 minutes. It was then filtered using a 10 mesh stainless steel sieve and the warm water wash was collected. The flake mixture was then added to 400 mL water in a large beaker, stirred by hand, and allowed to sit for 5 minutes. After this time, the sample was poured over the stainless steel mesh again and the water was discarded. The flakes were then dried in an oven at approximately 50^{o}C until they were dry to touch and free flowing. Representative images of the final mixture can be seen in Figure 10.

77. As can be seen in Figures 11 and 12, the ink is being removed during the caustic wash cycle. (See APPENDIX B). Further, the ink is readily separated from the

flake mixture during the sieving process and is not staining or dying the PET flakes. All flakes sink in the mixture as is demonstrated in Figure 16. (See APPENDIX B).

78. In connection with my analysis, I have considered that the Gatorade Label is an SKC Ecolabel™ sleeve label. Ex. 1013, at ¶47; Ex. 1016. And, the APR, the Association of Plastic Recyclers, has recognized this label as meeting or exceeding APR's Critical Guidance Protocol for Clear PET Articles with Labels and Closures Document requirements. Ex. 1013, at ¶47; Ex. 1018. The SKC Ecolabel™ has received APR Critical Guidance recognition. *Id.* In particular, a Review Committee, appointed per the APR Recognition Operating Procedures, reviewed an April 26, 2019 data submission and concluded the data were correctly obtained by a qualified laboratory and were completely presented to show the labels submitted meet or exceed all critical guidance. This supports my analysis and my conclusions.

79. In connection with my analysis, I have also considered that the silver ink used in connection with the Gatorade Label is supplied by a company, Watson Standard, which confirms that the silver ink passes recyclability/bleed testing set forth in the protocol established by the Association of Postconsumer of Plastic Recyclers. Ex. 1013, at ¶48; Ex. 1019. This supports and confirms my analysis and my conclusions.

[Claim 2] The recyclable shrink label of claim 1 further comprising an indicia layer.

80. Each label contains an indicia layer as can be seen in Figure 1. (See APPENDIX B).

[Claim 3] The recyclable shrink label of claim 1 further comprising a high opacity layer comprising a white pigment.

81. The labels all contain a high opacity layer comprised of rutile titanium dioxide. The composition of the high opacity layer was analyzed via SEM-EDS and Raman spectroscopy. Raman analysis is conducted with a Horiba LabRAM HR Raman microscope with a 637 nm laser and 600 grooves per millimeter grating. As can be seen in Figures 6 and 13, the high opacity component of each layer is consistent with rutile titanium dioxide. (See APPENDIX B).

[Claim 5] The heat shrink film is comprised of polyethylene terephthalate (PET)

82. The heat shrink film is comprised of polyethylene terephthalate (PET) as can be seen in Figures 2 and 3. (See APPENDIX B).

[Claim 6] The recyclable shrink label according to claim 1, wherein the recyclable shrink label is in a form of a sleeve or tube.

83. All samples received are in the form of a sleeve or tube, with one seam, as is demonstrated in Figure 16.

Figure 16. Representative As Received photographs of samples 3191115 and 3191169 representing that all received samples are a tube or sleeve. Close up images show the seam

[Claim 7] The recyclable shrink label according to claim 6, wherein the heat shrink film comprises a seam.

84. All samples received are in the form of a sleeve or tube, with a seam, as is demonstrated in Figure 16. (See APPENDIX B).

[Claim 8] Claim 8: The recyclable shrink label according to claim 1, wherein when heated to 100° C, the heat shrink film contracts or shrinks by about 1% to about 90%.

85. Samples 3191115, 3191158, 3191168, and 3191171 were selected for heat shrink testing in general accordance with ASTM D2732. Ex. 1015.

86. As can be seen in Figure 17 (below), approximately 100 mm by 100 mm square sections of each sample were cut using stainless steel scissors.

Figure 17. Photographs of cut section of 3191115, 3191158, 3191168, and 3191171 before shrink testing.

87. Each sample was then placed in a stainless mesh and submerged in a water bath at 100 ºC for ten seconds, followed by quenching in a room temperature water bath. Exemplar photographs of experimental setup can be seen in Figure 18. (See APPENDIX B).

88. As can be seen in Figure 19 (below), each sample shrunk perpendicular to the seam by approximately 70-80% when heated to 100° C.

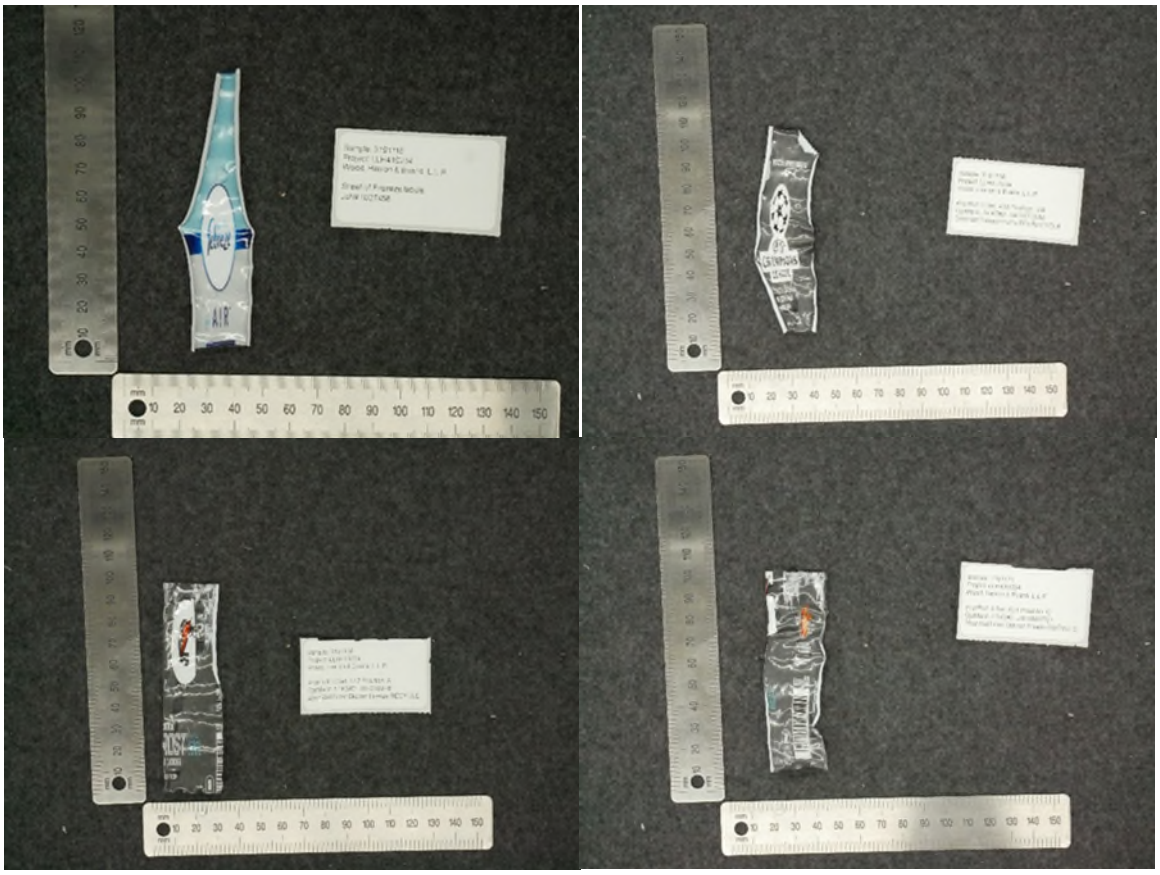


Figure 19. Photographs of cut sections of 3191115, 3191158, 3191158, 3191158, and 3191171 after shrink testing**.**

[Claim 9] The recyclable shrink label according to claim 1, wherein when heated to 100° C., the entire recyclable shrink label contracts or shrinks by about 1% to about 90%.

89. As can be seen in Figure 18 (See APPENDIX B), the label shrinks upon submersion in the boiling water. As can be seen in Figure 19 (above), the entire label shrinks when subjected to 100 ^{o}C water for 10 seconds.

[Claim 10] The recyclable shrink label according to claim 3, wherein the high opacity layer comprises a pigment selected from titanium dioxide (TiO2), precipitated calcium carbonate (PCC), aluminum silicate, aluminum oxide (alumina), mica-based pigments coated with thin layer(s) of white pigment, or a combination thereof.

90. The labels all have a high opacity layer that contains titanium dioxide, as can be seen in Figures 6 and 13. (See APPENDIX B).

[Claim 11] The recyclable shrink label according to claim 1, wherein the light blocking component comprises zinc, aluminum, copper, silver, or an alloy thereof, titanium dioxide, carbon black, mica, a reflective pigment, a polymer capable of blocking light, a mineral capable of blocking light, or a combination thereof.

91. The labels all have a light blocking component that contains aluminum, as can be seen in Figure 6. (See APPENDIX B).

[Claim 12] The recyclable shrink label according to claim 1, wherein the light blocking layer is present in an amount of 0.5 ppr to 25 ppr relative to the recyclable shrink label.

92. As defined in the ‘422 patent, at column 5 line 44, “ppr” refers to pounds per ream. One ream is understood to mean 3000 square feet of substrate. The following calculations are based on the aluminum light blocking layer covering the entire ream.

93. Inductively Coupled Plasma (ICP) was used to quantify the amount of aluminum in sample 3191115 and was found to be 1.56 weight percent. The mass of a 5 square centimeter portion of the sample that was covered by light blocking material was 0.1624 grams. For a 3000 square foot ream, this corresponds to 0.6 pounds of aluminum per ream. To calculate the ppr of the light blocking layer, the weight percent of aluminum in a label sample was measured via Inductively Coupled Plasma (ICP). The light blocking layer comprises other solid components along with the aluminum flakes. To compensate for the additional solids, an estimate of 10% of the mass of aluminum was included in the calculation of ppr for the light blocking layer. To calculate ppr, a 5 square centimeter portion of each label that was uniformly covered by the light blocking layer was weighed.

94. For sample 3191115, the mass of a 5 square centimeter portion of the sample that was covered by light blocking material was 0.1624 grams. For a 3000 square foot ream, this corresponds to 3.4 pounds of light blocking layer per ream.

95. For sample 3191158, the mass of a 5 square centimeter portion of the sample that was covered by light blocking material was 0.1558 grams. For a 3000 square foot ream, this corresponds to 0.5 pounds of light blocking layer per ream.

96. For sample 3191168, the mass of a 5 square centimeter portion of the sample that was covered by light blocking material was 0.1474 grams. For a 3000 square foot ream, this corresponds to 0.5 pounds of light blocking layer per ream. For sample 3191171, the mass of a 5 square centimeter portion of the sample that was

covered by light blocking material was 0.1598 grams. For a 3000 square foot ream, this corresponds to 0.5 pounds of light blocking layer per ream.

[Claim 13] The recyclable shrink label according to claim 1, wherein the light blocking layer comprises from 0.1 ppr to 10 ppr of the light blocking component.

97. Inductively Coupled Plasma (ICP) was used to quantify the amount of aluminum in sample 3191115 and was found to be 1.56 weight percent. The mass of a 5 square centimeter portion of the sample that was covered by light blocking material was 0.1624 grams. For a 3000 square foot ream, this corresponds to 3.1 pounds of aluminum per ream. ICP was used to quantify the amount of aluminum in sample 3191157 and was found to be 0.234 weight percent. The mass of a 5 square centimeter portion of the sample that was covered by light blocking material was 0.1558 grams. This corresponds to 0.4 pounds of aluminum per ream. ICP was used to quantify the amount of aluminum in sample 3191167 and was found to be 0.270 weight percent. The mass of a 5 square centimeter portion of the sample that was covered by light blocking material was 0.1474 grams. This corresponds to 0.5 pounds of aluminum per ream. ICP was used to quantify the amount of aluminum in sample 3191176 and was found to be 1.45 weight percent. This corresponds to 2.41 weight percent aluminum. The mass of a 5 square centimeter portion of the sample that was covered by light blocking material was 0.1598 grams. This corresponds to 0.5 pounds of aluminum per ream. These values all fall within the claimed range.

[Claim 14] An article comprising: a container comprising polyethylene terephthalate (PET) and defining an external surface; and the recyclable shrink label of claim 1 disposed on the container.

98. Attached to the Craig Bushman declaration is what I understand to be the bottles to which the tested labels are affixed, which are accordingly recyclable PET bottles. Ex. 1013, at ¶49. The internal surface of the sleeve or tube is the surface that would face the container, as is therefore disposed thereon. *Id.*

[Claim 15] The article according to claim 14, wherein the first surface of the heat shrink film faces the external surface of the container.

99. As can be seen in Figures 5 and 6, sample 3191115 has the light blocking facing the external surface of the container, followed by the high opacity layer, followed by the PET film. Samples 3191157, 3191167, and 3191176 have the high opacity label facing the external surface of the container, followed by the light blocking layer, followed by the PET film. (See APPENDIX B).

[Claim 16] The recyclable shrink label according to claim 2, wherein the indicia layer is disposed on the first surface.

100. The labels analyzed here contain an indicia layer located between the PET film and the high opacity layer. (See APPENDIX B).

[Claim 17] The recyclable shrink label according to claim 8, wherein the heat shrink film contracts or shrinks by about 1% to 90% in a transverse direction.

101. As can be seen in Figure 19, each sample shrunk in the transverse direction by approximately 70-80% when heated to 100° C.

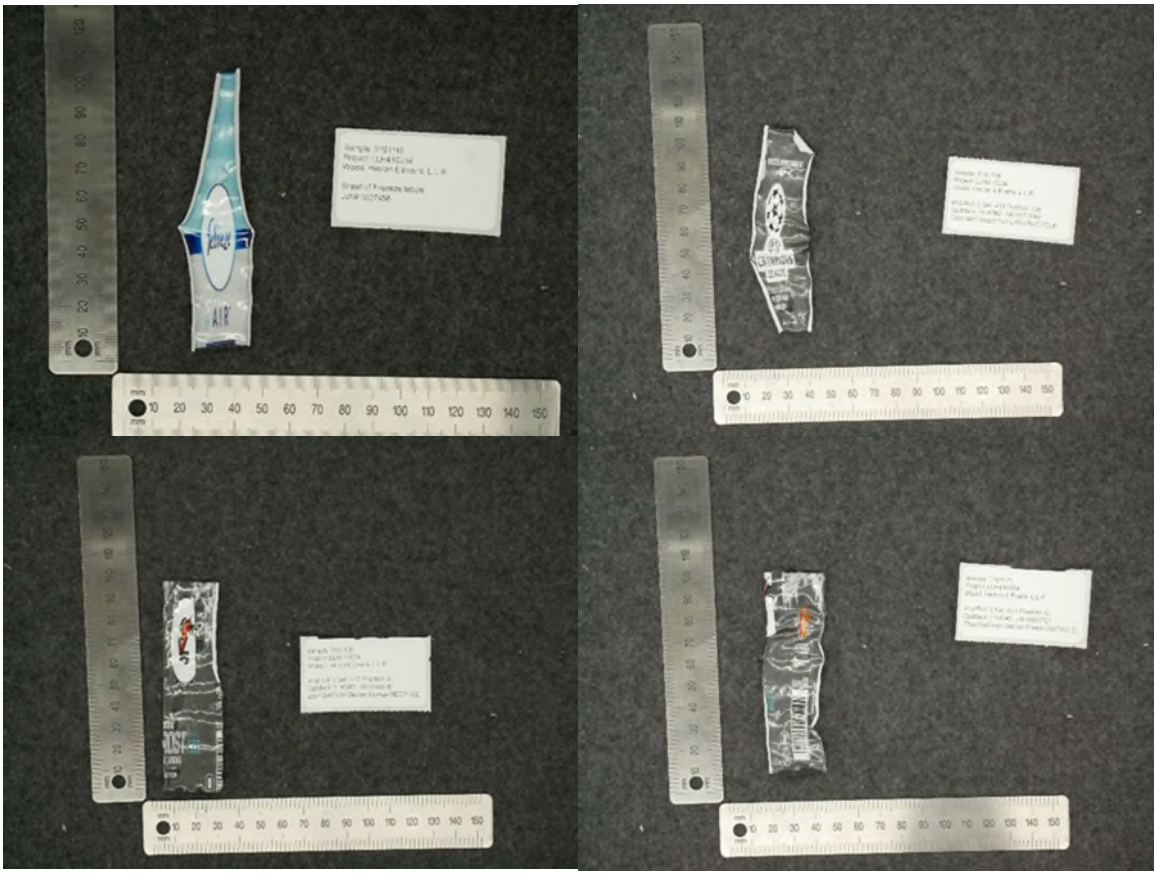


Figure 19. Photographs of cut sections of 3191115, 3191158, 3191158, and 3191171 after shrink testing.

[Claim 18] The recyclable shrink label according to claim 1, wherein the heat shrink film comprises crystallizable poly- ethylene terephthalate (PET).

102. As can be seen in Figures 2 and 3 (See APPENDIX B), each film is consistent with an internal PET standard measured on the same instrument as well as a PET standard matched to the Wiley KnowItAll Library. As can be seen, all samples are consistent with PET. In addition, I am relying on the Declaration of Mr. Craig Bushman with regard to PET that is crystallizable. Ex. 1013, at ¶44; Ex. 1017.

[Claim 19] A recyclable shrink label comprising: a heat shrink film comprising polyethylene terephthalate (PET).

103. As can be seen in Figures 2 and 3 (See APPENDIX B), each film is consistent with an internal PET standard measured on the same instrument as well as a PET standard matched to the Wiley KnowItAll Library. As can be seen, all samples are consistent with PET.

[Claim 19 (cont.)] …and having a first surface and a second surface opposite of the first surface, the heat shrink film having a thickness from 15 µm to 100 µm.

104. As can be seen in Figure 5 (See APPENDIX B), all samples have a heat shrink PET film thickness of approximately 40-50 microns.

[Claim 19 (cont.)] a light blocking layer disposed adjacent the first surface and comprising a light blocking component, the light blocking layer being constructed for the recyclable shrink label to block at least 80% of incident light having wavelengths in a range of 200 nm to 900 nm…

105. Percent Transmittance results can be seen in Figure 7. (See APPENDIX B). All samples block at least 80% of light in the 220 to 900 nm range.

[Claim 19 (cont.)] …a high opacity layer comprising a white pigment, wherein the recyclable shrink label is recyclable with a PET container.

106. The high opacity layer in the analyzed samples is consistent with rutile titanium dioxide, as can be seen in Figures 6 and 14. (See APPENDIX B).

D. GROUND 2: THE GATORADE LABEL, BASED ON KNOWLEDGE OF A POSITA (INCLUDING MITCHELL ET AL. (US 2017/0223879)), RENDERS CLAIM 4 OBVIOUS

107. Ground 2 presents that the Gatorade Label-Knowledge of a POSITA (including Mitchell et al. (US 2017/0223879)) combination renders claim 4 obvious under §103.

1. Overview of the Knowledge of a POSITA (including Mitchell et al. (US 2017/0223879)

108. The Examiner cited Mitchell et al. (US 2017/0223879) during prosecution of the application that issued as the '422 patent. The Examiner noted that "[i]t would have been obvious to one of ordinary skill in the art before the effective filing date of the claimed invention to provide the metallization layer (high opacity layer) such that it is positioned between the printing (indicia layer) and the third layer/skin (7; light blocking layer) to ensure the printing is visible and provide (sic) a metallic look to the label." Ex. 1002, at 239.

109. I also understand that it would have been known to a skilled artisan in the field of labels to change the order of the layers. For example, changing the order of the layers with regard to the Gatorade Label, to apply the printed white ink opacity layer and then the printed metallic layer, is simply a matter of changing the ink printed within each printing station on the press. Ex. 1013, at ¶50. Such a change would result in the high opacity layer such that it is positioned between the indicia layer and the light blocking layer and this would be a simple change to the manufacturing process for the Gatorade Label. *Id.*

110. In this regard, the scope and content of the prior art (Gatorade Label and Mitchell et al. (US 2017/0223879)) is extremely broad and close to the claims of the '422 patent, such that there is little difference between the prior art and the claims. In nearly identical manner to this prior art, claim 4 of the '422 patent provides a shrink label with an indicia layer "wherein the high opacity layer is disposed between the indicia layer and the light blocking layer."

2. The Combination and how it would be implemented

111. The Gatorade Label is a recyclable shrink label that comprises an indicia layer, a high opacity layer, and a light blocking layer, in close proximity to each other. Ex. 1013, at ¶¶44, 50. In like manner, and as explained (e.g., above at ¶¶42-43 and 49-50; Ex. 1013, at ¶¶40-41 and 47-48), Mitchell et al. (US 2017/0223879) is a shrink label that comprises an indicia layer, a high opacity layer, and a light blocking layer, in close proximity to each other. Thus, the Gatorade Label and Mitchell et al. (US 2017/0223879) are similar in purpose, composition, and structure. In addition, the layers of the Gatorade Label and Mitchell et al. (US 2017/0223879) are similar, including with their locations with respect to each other.

112. As explained above, the Examiner cited Mitchell et al. (US 2017/0223879) during prosecution of the application that issued as the '422 patent. The Examiner noted that "[i]t would have been obvious to one of ordinary skill in the art before the effective filing date of the claimed invention to provide the metallization layer (high opacity layer) such that it is positioned between the printing

(indicia layer) and the third layer/skin (7:light blocking layer) to ensure the printing is visible and provide (sic) a metallic look to the label." Ex. 1002, at 239. In connection herewith, I am considering and relying upon the Examiner's determination and accompanying information from Mr. Craig Bushman. Ex. 1013, at ¶¶40-41 and 47-48.

113. In other words, only a very minor modification of the Gatorade Label is required. That is, only the light blocking layer would be moved such that the high opacity layer is disposed between the indicia layer and the light blocking layer. Notably, no additional structures need to be added or removed from the Gatorade Label.

3. Motivation for the Combination, and Reasonable Expectation of Success

114. Multiple reasons would have prompted a POSITA to implement the Gatorade Label with the knowledge of a POSITA, including Mitchell et al. (US 2017/0223879), such that the high opacity layer is disposed between the indicia layer and the light blocking layer.

115. In connection herewith, I am considering and relying upon the Declaration of Mr. Craig Bushman, Ex. 1013.

116. First, recyclable packaging has been known for decades. The '422 patent specification acknowledges as Background to the purported invention that "the consumer packaged-goods markets globally aspire to utilize recyclable packaging for

most products." The '422 patent provides an example of that known recyclable packaging as "…PET packaging," which "provides a cost effective recyclable option." Ex. 1001, at 1:14-23. In addition, the '422 patent specification acknowledges that the market has required light protective packaging, so as to block light waves that are harmful to ingredients. Ex. 1001, at 1:14-23. That is because harmful light waves are known to impact the shelf life and performance of those products. *Id.* The Gatorade Label is a recyclable shrink label that is light blocking, and the knowledge of a POSITA, including Mitchell et al. (US 2017/0223879) includes a shrink label that is light blocking. Thus, a POSITA would be knowledgeable of the Gatorade Label and the label disclosed in Mitchell et al. (US 2017/0223879), and would know that they serve similar purposes.

117. Second, the Gatorade Label and the knowledge of a POSITA, including Mitchell et al. (US 2017/0223879) includes a shrink label that is light blocking, and labels relating to light blocking. Thus, a POSITA would have knowledge of both labels, and would know that they serve similar purposes.

118. Third, a POSITA would have recognized such construction as promoting light blocking and recyclability. That is, it was known to use recyclable labels, such as the Gatorade Label, and it was known to use light blocking labels, within such knowledge of a POSITA, including Mitchell et al. (US 2017/0223879). In addition, for these reasons, a POSITA would have been motivated to rely upon the teaching of

each, including the teaching of knowledge of a POSITA, including Mitchell et al. (US 2017/0223879), such that the high opacity layer is disposed between the indicia layer and the light blocking layer.

119. Fourth, a POSITA would have recognized such construction as allowing visibility of the label. Indeed, the Examiner notes that such construction "ensure[s] the printing is visible and provide (sic) a metallic look to the label." Ex. 1002 at 239.

120. Fifth, a POSITA would have understood that only a very minor modification (as previously described) of the Gatorade Label is required. Notably, no additional structures need to be added or removed from the Gatorade Label.

121. Sixth, the Gatorade Label is a recyclable shrink label that comprises an indicia layer, a high opacity layer, and a light blocking layer, in close proximity to each other. In like manner, the knowledge of a POSITA, including Mitchell et al. (US 2017/0223879) includes a recyclable shrink label that comprises an indicia layer, a high opacity layer, and a light blocking layer, in close proximity to each other. Thus, the Gatorade Label and the knowledge of a POSITA, including Mitchell et al. (US 2017/0223879) are similar in purpose, composition, and structure. In addition, the layers of the Gatorade Label and the knowledge of a POSITA, including Mitchell et al. (US 2017/0223879) are similar, including with their locations with respect to each other.

122. Seventh, a POSITA would have been prompted to modify the Gatorade Label because doing so was the application of known techniques (e.g., label

manufacturing and adjustment of label layers) to a known device (e.g., the Gatorade Label) for improvement to yield predictable results (e.g., a heat shrink label with light blocking capabilities and for a light blocking purpose, and ensuring the printing is visible and providing a metallic look to the label). Additionally, I note that a POSITA would have had a reasonable expectation of success in making the proposed modification because no additional layers are required and only a minor adjustment to label layers is required.

[Claim 4] The recyclable shrink label of claim 3, wherein the recyclable shrink label comprises an indicia layer and wherein the high opacity layer is disposed between the indicia layer and the light blocking layer.

123. As can be seen in Figures 5a and 6a, and demonstrated optically in 15a, the high opacity layer for sample 3191115 is located between the PET layer and the light blocking layer. An indicia layer on this sample would be located between the high opacity layer and the PET layer. As can be seen in Figures 5b-d and 6b-d (See APPENDIX B), and demonstrated optically in 15b-d, the light blocking layer for samples 3191157, 3191167, and 3191176 is located between the PET layer and the high opacity layer, and any indicia layer would be located between the PET layer and the high opacity layer. If the teachings of the knowledge of a POSITA, including Mitchell et al. (US 2017/0223879) was combined with the Gatorade Label, the indicia layer, the high opacity layer, and the light blocking layer would be structured such that the high opacity layer is disposed between the indicia layer and the light blocking layer. Thus, this claim limitation would be disclosed by the combination.

E. GROUND 3: THE GATORADE LABEL-THE FEBREZE LABEL RENDERS CLAIM 4 OBVIOUS

124. Ground 3 presents that the Gatorade Label-Febreze Label combination renders claim 4 obvious under §103.

1. Overview of the Febreze Label (Ex. 1004)

125. As explained above, the Gatorade Label is a shrink sleeve label that is recyclable with a PET container. Ex. 1013, at ¶44. It is a PET film and a washable ink system designed to meet the requirements of recyclability per the APR. *Id.* It includes light blocking features (including ink layers of metal particulates, and including aluminum and titanium dioxide for the silver and white ink). *Id.*

126. The Febreze Label is a shrink sleeve label. Ex. 1013, at ¶¶52-57. It includes light blocking features (including ink layers of metal particulates, and including aluminum and titanium dioxide for the silver and white ink). *Id.* at ¶52. The Febreze Label is structured such that the high opacity layer is disposed between the indicia layer and the light blocking layer. *Id.* at ¶56.

127. The Febreze Label was produced and sold publicly in 2018, in substantial quantities. Ex. 1013, at ¶¶53-54.

128. In this regard, the scope and content of the prior art (Gatorade Label and Febreze Label) is extremely broad and close to the claims of the ‘422 patent, such that there is little difference between the prior art and the claims. In nearly identical manner to this prior art, especially the Febreze Label, claim 4 of the ‘422 patent

provides a shrink label with an indicia layer "wherein the high opacity layer is disposed between the indicia layer and the light blocking layer."

2. The Combination and how it would be implemented

129. The Gatorade Label is a recyclable shrink label that comprises an indicia layer, a high opacity layer, and a light blocking layer, in close proximity to each other. Ex. 1013, at ¶¶44, 50. In like manner, the Febreze Label is a shrink label that comprises an indicia layer, a high opacity layer, and a light blocking layer, in close proximity to each other. *Id.* at ¶56. Thus, the Gatorade Label and the Febreze Label are similar in purpose, composition, and structure. In addition, the layers of the Gatorade Label and the Febreze Label are similar, including with their locations with respect to each other.

130. As explained above, the Febreze Label is structured such that the high opacity layer is disposed between the indicia layer and the light blocking layer. *Id.* at ¶56. The only modification to the Gatorade Label required to achieve this combination is to adjust the relative location of the indicia layer, a high opacity layer, and a light blocking layer, such that the high opacity layer is disposed between the indicia layer and the light blocking layer. *Id.* at ¶¶50-51.

131. In other words, only a very minor modification of the Gatorade Label is required. *Id.* That is, only the light blocking layer would be moved such that the high opacity layer is disposed between the indicia layer and the light blocking layer. *Id.*

Notably, no additional structures need to be added or removed from the Gatorade Label. *Id.*

3. Motivation for the Combination, and Reasonable Expectation of Success

132. Multiple reasons would have prompted a POSITA to implement the Gatorade Label with the disclosure of the Febreze Label, such that the high opacity layer is disposed between the indicia layer and the light blocking layer.

133. In connection herewith, I am considering and relying upon the Declaration of Mr. Craig Bushman, Ex. 1013.

134. First, recyclable packaging has been known for decades. The '422 patent specification acknowledges as Background to the purported invention that "the consumer packaged-goods markets globally aspire to utilize recyclable packaging for most products." The '422 patent provides an example of that known recyclable packaging as "…PET packaging," which "provides a cost effective recyclable option." Ex. 1001, at 1:14-23. In addition, the '422 patent specification acknowledges that the market has required light protective packaging, so as to block light waves that are harmful to ingredients. Ex. 1001, at 1:14-23. That is because harmful light waves are known to impact the shelf life and performance of those products. *Id.* The Gatorade Label is a recyclable shrink label that is light blocking, and the Febreze Label is a shrink label that is light blocking. Thus, a POSITA would be knowledgeable of both labels, and would know that they serve similar purposes.

135. Second, the Gatorade Label and the Febreze Label were manufactured and sold publicly by the same entity, an entity well known with respect to labels, shrink sleeve labels, and labels relating to light blocking. Thus, a POSITA would be knowledge of both labels, and would know that they serve similar purposes.

136. Third, a POSITA would have recognized such construction as promoting light blocking and recyclability. That is, it was known to use recyclable labels, such as the Gatorade Label, and it was known to use light blocking labels, such as the Febreze Label. In addition, for these reasons, a POSITA would have been motivated to rely upon the teaching of each, including the teaching of the Febreze Label, such that the high opacity layer is disposed between the indicia layer and the light blocking layer.

137. Fourth, a POSITA would have been motivated to modify the Gatorade Label because the Febreze Label was a well-known, publicly sold, product. Thus, a POSITA would have been motivated to rely upon the teachings of such a product, including the high opacity layer is disposed between the indicia layer and the light blocking layer.

138. Fifth, a POSITA would have understood that only a very minor modification of the Gatorade Label is required. Notably, no additional structures need to be added or removed from the Gatorade Label.

139. Sixth, the Gatorade Label is a recyclable shrink label that comprises an indicia layer, a high opacity layer, and a light blocking layer, in close proximity to each other. In like manner, the Febreze Label is a shrink label that comprises an indicia layer, a high opacity layer, and a light blocking layer, in close proximity to each other. Thus, the Gatorade Label and the Febreze Label are similar in purpose, composition, and structure. In addition, the layers of the Gatorade Label and the Febreze Label are similar, including with their locations with respect to each other.

140. Seventh, a POSITA would have been prompted to modify the Gatorade Label because doing so was the application of known techniques (e.g., label manufacturing and adjustment of label layers) to a known device (e.g., the Gatorade Label) for improvement to yield predictable results (e.g., a heat shrink label with light blocking capabilities and for a light blocking purpose). Additionally, I note that a POSITA would have had a reasonable expectation of success in making the proposed modification because no additional layers are required and only a minor adjustment to label layers is required.

[Claim 4] The recyclable shrink label of claim 3, wherein the recyclable shrink label comprises an indicia layer and wherein the high opacity layer is disposed between the indicia layer and the light blocking layer.

141. As can be seen in Figures 5a and 6a, and demonstrated optically in 15a, the high opacity layer for sample 3191115 is located between the PET layer and the light blocking layer. An indicia layer on this sample would be located between the

high opacity layer and the PET layer. As can be seen in Figures 5b-d and 6b-d (See APPENDIX B), and demonstrated optically in 15b-d, the light blocking layer for samples 3191157, 3191167, and 3191176 is located between the PET layer and the high opacity layer, and any indicia layer would be located between the PET layer and the high opacity layer. If the teachings of the Febreze Label was combined with the Gatorade Label, the indicia layer, the high opacity layer, and the light blocking layer would be structured such that the high opacity layer is disposed between the indicia layer and the light blocking layer. Thus, this claim limitation would be disclosed by the combination.

F. GROUND 4: CLAIMS 1-19 ARE INDEFINITE UNDER 35 U.S.C. § 112

142. As described above, my understanding is that a claim is indefinite if it might have several meanings, and a POSITA would not be able to make a confident choice as to which meaning is appropriate. *Supra* Section V.E.

143. Independent claim 1 and independent claim 19 (and therefore all dependent claims) each recite "wherein the recyclable shrink label is recyclable." The claim language has multiple possible meanings, making it impossible for a POSITA to determine a definitive meaning and thus scope of the claim. Therefore, these claims are indefinite.

144. The '422 patent defines what renders a shrink label recyclable, but does so in several disparate ways.

145. First, the ‘422 patent provides “Generally clear crystallizable heat shrink films (e.g., PET shrink films) are considered recyclable if no inks are retained on the film after a caustic wash cycle typically used in PET reclaiming processes.” Ex. 1001, at 6:61-65. This demonstrates that ink wash-off from crystallizable PET films is a sufficient requirement to fall within the scope of the claim term “wherein the recyclable shrink label is recyclable.”

146. Second, the ‘422 patent provides “According to an embodiment, the inks utilized in the labels of the present disclosure, including the light blocking inks, are designed to wash off the film during a reclaiming process allowing the labels and containers they cover to be recycled.” Ex. 1001, at 7:9-13.

147. Third, the ‘422 patent provides “According to an embodiment, the labels of the present disclosure can meet certain industry standards, including for example the Association for Plastic Recyclers (APR) Critical Guidance Protocol for Clear PET Articles with Labels and Closures (PET-CG-02), which can be considered as certifying that the film is fully recyclable with the container or bottle.” Ex. 1001, at 11:29-53.

148. Fourth and Fifth, the ‘422 patent provides “In some embodiments, the labels of the present disclosure are recyclable according to Evaluation of the Near Infrared (NIR) Sorting Potential of a Whole Plastic Article (SORT-B-01), Evaluation of Sorting Potential for Plastic Articles Utilizing Metal, Metalized or Metallic Printed Components (SORT-B-03), or both.” *Id.*

149. Sixth, the ‘422 patent provides “That is, according to an embodiment, the labels of the present disclosure are fully recyclable.” *Id.*

150. Seventh, the ‘422 patent provides “For example, the labels may include inks that can be washed off in a typical PET recycling wash (caustic wash) and the polymers used in the labels are preferably clear (preferably clear PET).” *Id.*

151. Eighth, the ‘422 patent provides “According to an embodiment, the labels are free or substantially free of inks that cannot be washed off in a caustic wash.” *Id.*

152. Ninth, the ‘422 patent provides “According to an embodiment, the labels are free or substantially free of colored plastics (including white plastics) that cannot be recycled.” Ex. 1001, at 11:29-53. *Id.*

153. Tenth, as explained above in connection with the prosecution of the application that issued as the ‘422 patent, Applicant argued over the prior art that “[e]ven if the label in Mitchell ‘879 was otherwise capable of being recycled, the pigments being incorporated into the core layer polymer would contaminate the polymer flake during the recycling process…[i]n contrast, the present application teaches that the inks and pigments used in the recyclable shrink label may be removed by washing, leaving behind a label that can be recycled with the article.” Ex. 1002, at 337.

154. The claim term "wherein the recyclable shrink label is recyclable" is therefore disclosed in multiple different alternate ways in the '422 patent. That is, a POSITA would understand that the '422 patent provides numerous different definitions regarding what constitutes a shrink label that is recyclable. There is nothing in the '422 patent that provides clarification regarding which of the definitions is the appropriate manner in which to determine what falls within the scope of this claim term.

155. As an example, it could be that to fall within the scope of this claim term that no inks are retained on the film after a caustic wash cycle typically used in PET reclaiming processes, or it could be that to fall within the scope of this claim term, inks only need to be designed to wash off the film during a reclaiming process allowing the labels and containers they cover to be recycled, or it could be that to fall within the scope of this claim term, the Association for Plastic Recyclers (APR) Critical Guidance Protocol for Clear PET Articles with Labels and Closures (PET-CG-02) must be complied with.

156. As another example, it could be that to fall within the scope of this claim term the labels must be recyclable according to Evaluation of the Near Infrared (NIR) Sorting Potential of a Whole Plastic Article (SORT-B-01), or must be recyclable according to Evaluation of Sorting Potential for Plastic Articles Utilizing Metal, Metalized or Metallic Printed Components (SORT-B-03), "or both" must be recyclable according to SORT-B-01 and SORT-B-03.

157. As another example, it could be that to fall within the scope of this claim term the labels are free of inks, are substantially free of inks, or if no inks are retained on the film.

158. As another example, it is undeterminable whether to fall within the scope of this claim term the labels need be recyclable or fully recyclable, or whether there is a difference between the two.

159. The ’422 patent does not provide details that make clear the intended meaning of “wherein the recyclable shrink label is recyclable” as all of the claims recite.

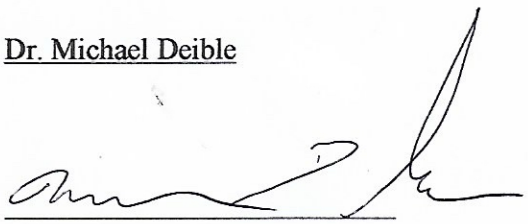
160. Accordingly, the scope of all of the claims of the ‘422 patent is unclear and the claims are unpatentable because they are indefinite.

IX. CONCLUSION

161. I currently hold the opinions set expressed in this declaration. But my analysis may continue, and I may acquire additional information and/or attain supplemental insights that may result in added observations.

DATE: Jan 16, 2025

NAME: Dr. Michael Deible

SIGNATURE: 

APPENDIX A

RJ Lee Group

Michael J. Deible, Ph.D.

Education

- Ph.D., Physical Chemistry, University of Pittsburgh, Pittsburgh, PA, 2015
- B.S., Chemistry Education, Indiana University of Pennsylvania, Indiana, PA, 2008

Employment History

- Principal Investigator, RJ Lee Group, Pittsburgh PA, 2023-Present
- Consulting Scientist, RJ Lee Group, Pittsburgh PA, 2017–2023
- Assistant Professor, United States Military Academy, West Point NY, 2015–2017
- Teacher, New Town High School, Baltimore, MD, 2008–2010
- Laboratory Technician, Environmental Service Laboratories, Indiana, PA, 2007–2008
- Military Police, Pennsylvania Army National Guard, Baghdad, Iraq, 2004-2005

Summary

- PFAS practice lead for a new laboratory department from instrument purchase through accreditation and routine analysis
- Testifying expert in arbitration matter related to material identification
- Experience with analysis of environmental contaminants, particularly PFAS and Microplastics in support of field investigations and remediation technology development
- Litigation support for matters related to patent infringement, PFAS, and other areas, with activities including material identification and characterization using multiple analytical methods, field sampling, and expert witness support.
- Experienced in the use of multiple analytical techniques such as GCMS, LCMS, FTIR, SEM, Raman, and TGA/DSC to classify materials
- Develops and employs experimental design to address challenging, non-standard chemical questions
- Experienced corrosion scientist in the field of detection, bench top experiments and failure analysis
- Employs failure analysis methods to determine root cause of failures
- Extensive study of the effect on interaction energies when changing the steering function of quantum Monte Carlo calculations
- Designed graphene electrodes for studies of electron transfer kinetics
- Applied cyclic voltammetry and scanning electron microscopy to characterize ultra-sharp platinum electrodes
- Bolstered experimental results with finite element simulations of electron transfer kinetics
- Adept at leveraging supercomputing assets and laboratory techniques in tandem

Professional Memberships

- American Chemical Society, member
- ASTM International, member; Voting member D-19: Water committee; Vice chair for D19.06: Organic Contaminants in Water

Publications and Presentations:

Deible, M., L. Miller, R. Hale, W. Lipps, "Update on ASTM WK88581 - New Test Method for Determination of Extractable Per-and Polyfluoroalkyl Substances (PFAS) in Solid Matrices by Solvent Extraction followed by Liquid Chromatography Tandem Mass Spectrometry (LC/MS/MS)", American Home Furnishings Regulatory Summit, Colfax, NC, 2024.

Deible, M., K. Rickabaugh, "Considerations for Sample Preparation for Particle-by-Particle Microplastic Analysis of Water Samples", ASTM Organized Symposium on Microplastics Analytical and Reference Standards -- Opportunities to Advance Microplastic Science, Seattle, WA, 2022.

Perricone, M.J., M. Deible, K.E. Wagner, and C.M. Hefferan, "Sensitization Behavior of Alloy C-276 as a Function of Mu Precipitation". Paper C2019-13421. Recent Experiences with Nickel, Titanium, Zirconium and other Corrosion Resistance Alloys. CORROSION 2019. Nashville, TN. March 2019.

Hefferan, C.M., M. Deible, M.J. Perricone, and K.E. Wagner, "Grain Boundary Corrosion of Alloy C-276 using Orientation Imaging via Electron Backscatter Diffraction Microscopy (EBSD)". Paper C2019-13418. Recent Experiences with Nickel, Titanium, Zirconium and other Corrosion Resistance Alloys. CORROSION 2019. Nashville, TN. March 2019.

Gasperich, K., M. Deible, K.D. Jordan, "H_4: A model system for assessing the performance of diffusion Monte Carlo calculations using a single Slater determinant trial function", The Journal of Chemical Physics 147 (7), 074106, 2017.

Deible, M.J., K.D. Jordan, "Exploration of Brueckner orbital trial wave functions in diffusion Monte Carlo calculations", Chemical Physics Letters 644, 117-120, 2016.

Alexander, R., M. Altamirano, S. Batdorj, M. Brooks, P. Brun, A. Del Angel, A. de la Rosa, C. Brewer, and M. Deible "System for Corrosion Inspection and Monitoring," *Ind. and Sys. Eng. Rev.*, 4(2), 82, 2016.

Deible, M.J., "Overview of Corrosion Activities in the Department of Civil and Mechanical Engineering at the United States Military Academy", Technical Corrosion Collaboration, Penn State, PA, 2016.

Deible, M.J., Kessler, K.E. Gasperich, K.D. Jordan, *"Quantum Monte Carlo calculation of the binding energy of the beryllium dimer," J. Chem. Phys.,* 143 *(8), 084116, 2015.*

Deible, M.J., "Calculating the adsorption energy of organic corrosion inhibitors on an iron substrate", DOD Allied Nations Corrosion Conference, Pittsburgh, PA, 2015.

Deible, M.J., O. Tuguldur, K.D. Jordan, "Theoretical Study of the Binding Energy of a Methane Molecule in a $(H_2O)_{20}$ Dodecahedral Cage," *J. Phys. Chem B*, 118 (28), 8257, 2014.

Wang, F., M.J. Deible, K.D. Jordan, "Benchmark Study of the Interaction Energy of an $(H_2O)_{16}$ Cluster: Quantum Monte Carlo and Complete Basis set Limit MP2 results," *J. Phys. Chem. A*, 117

(32), 7606, 2013.

Xu, J., M.J. Deible, K.A. Peterson, K.D. Jordan, "Correlation Consistent Gaussian Basis Sets for H, B-Ne with Dirac-Fock AREP Pseudopotentials: Applications in Quantum Monte Carlo Calculations," *J. Chem. Theory Comput.*, *9* (5), 2170, 2013.

Deible, M.J., "Quantum Monte Carlo benchmarks for weak non-covalent interactions", International Workshop on Quantum Monte Carlo, Apuan Alps Center for Physics, Italy, 2013.

Amemiya, S., N. Nioradze, P. Santhosh, M.J. Deible, "Generalized Theory for Nanoscale Voltammetric Measurements of Heterogeneous Electron-Transfer Kinetics at Macroscopic Substrates by Scanning Electrochemical Microscopy," *Anal. Chem.*, 83 (15), 5928, 2011.

APPENDIX B

Figure 1. Demonstrative As Received photographs of each sample group.

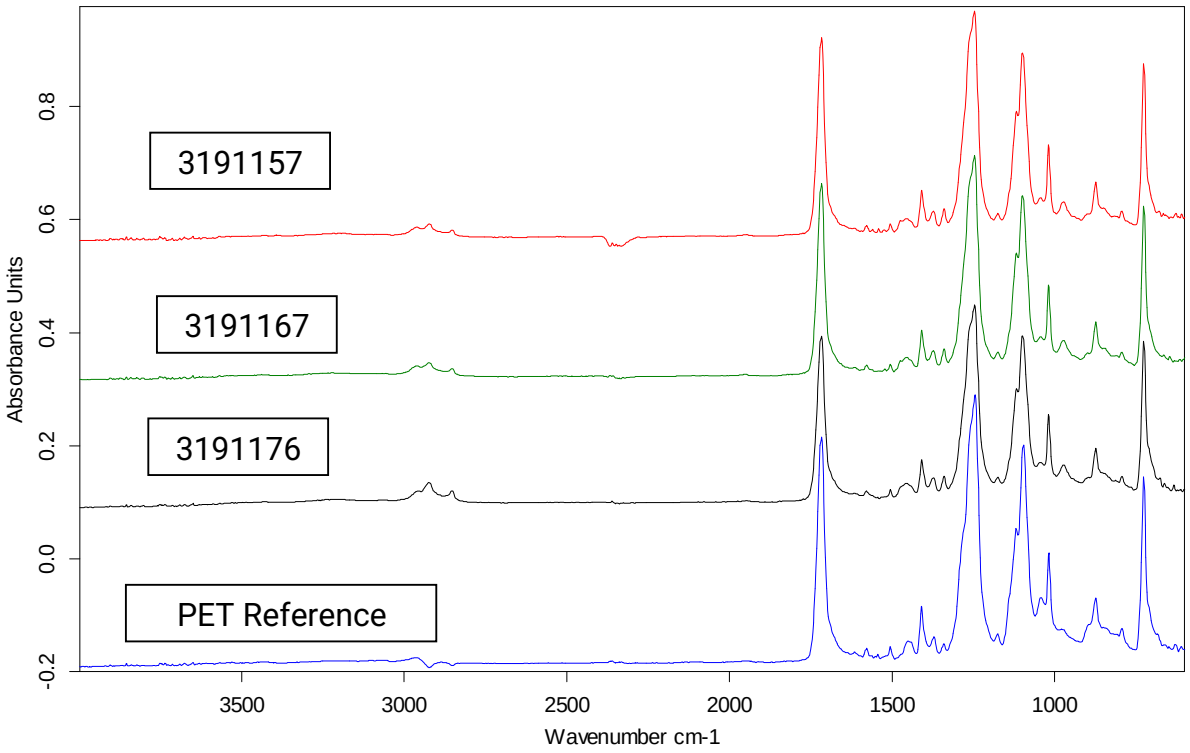


Figure 2. FTIR analysis of 3191157 (red spectra, top), 3191167 (green spectra), 3191176 (black spectra), and an internal PET standard (blue spectra, bottom).

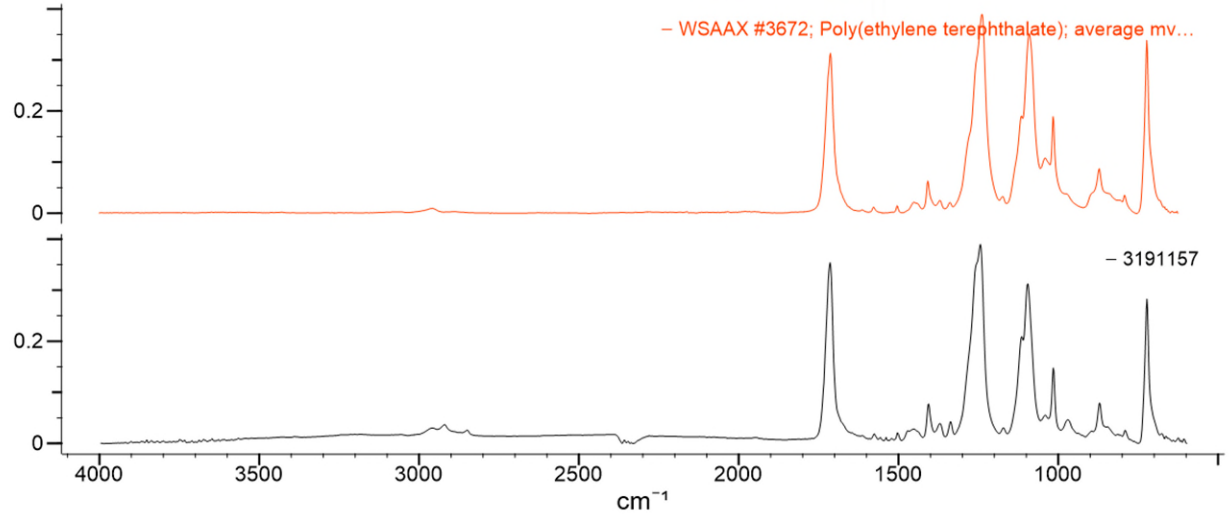


Figure 3. Comparison of representative FTIR analysis of 3191157 (black spectra) to a reference spectra matched to the Wiley KnowItAll library.

Figure 4. Location of each cross section taken from 3191115, 3191157, 3191167, and 3191176.

Figure 4 (cont). Location of each cross section taken from 3191115, 3191157, 3191167, and 3191176.

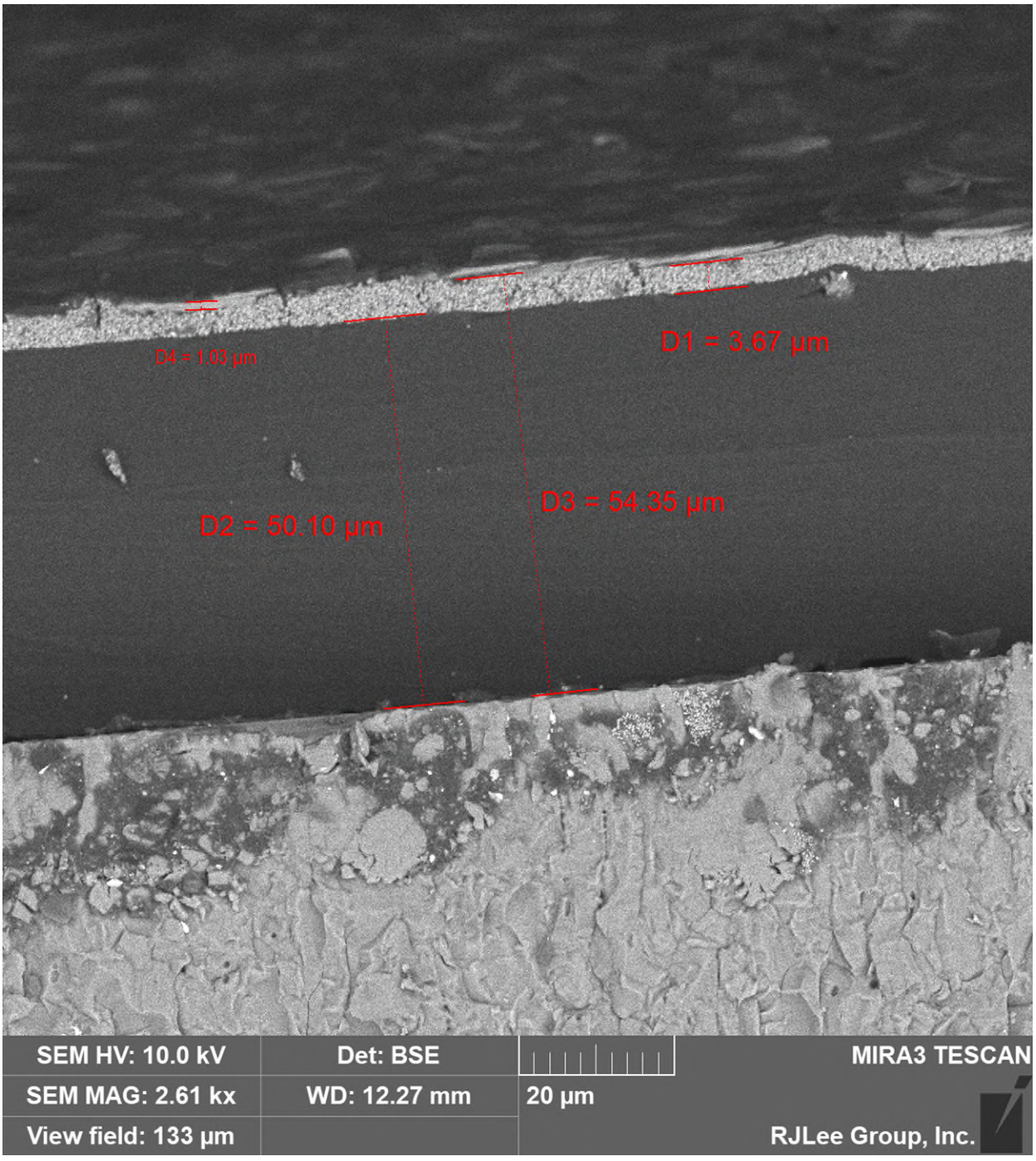


Figure 5a. SEM image of 3191115 cross section.

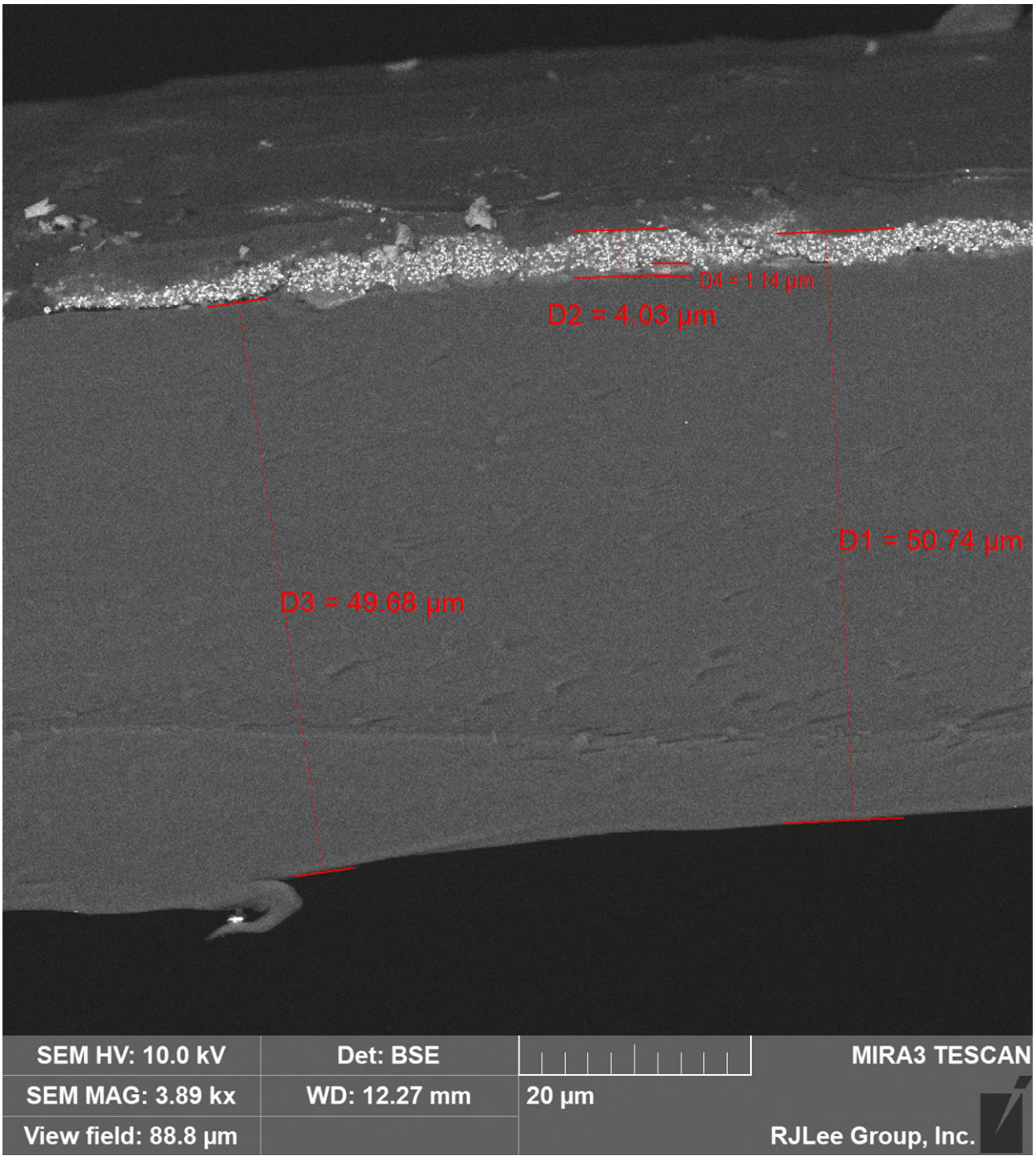


Figure 5b. SEM image of 3191157 cross section.

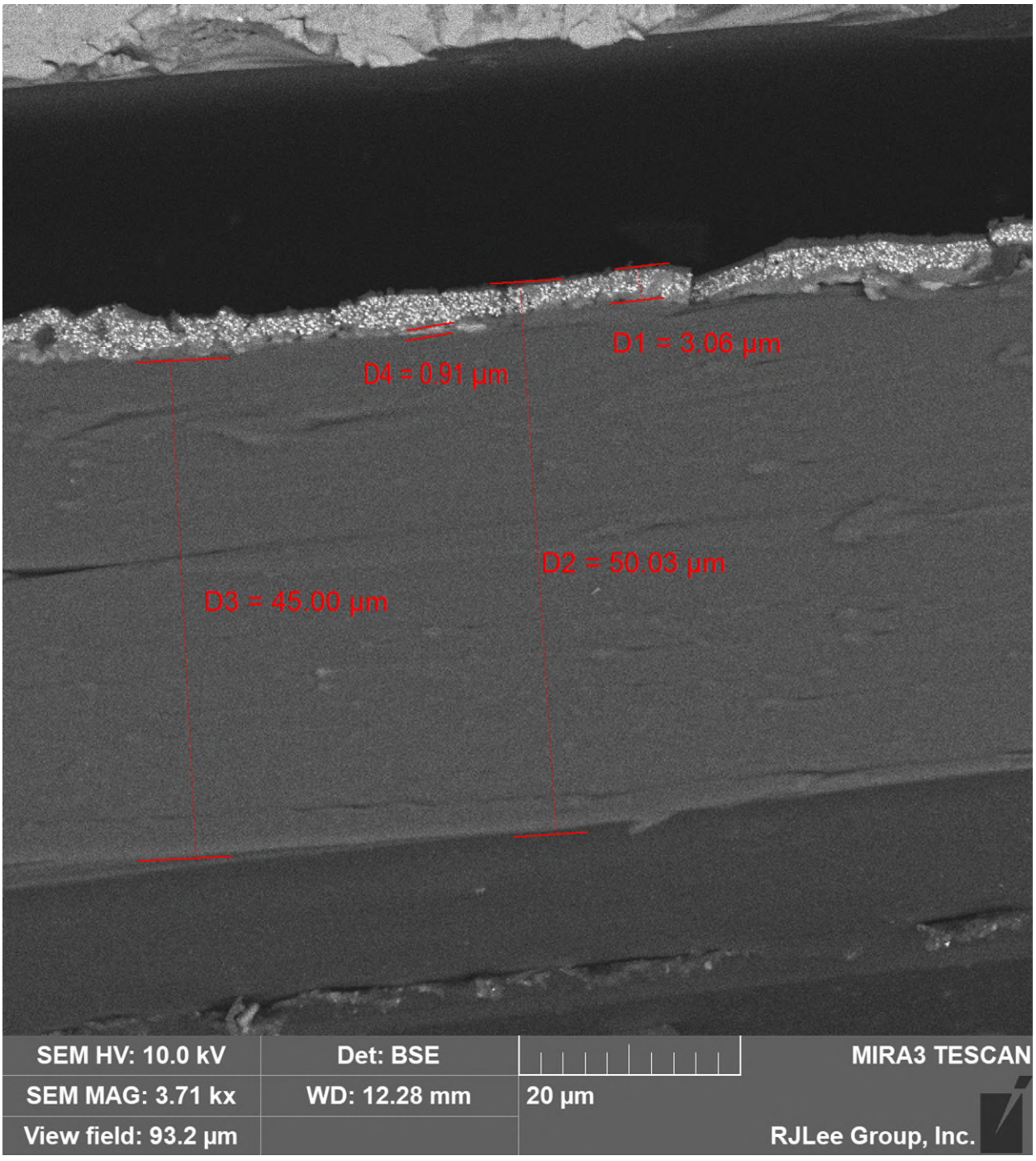


Figure 5c. SEM image of 3191167 cross section.

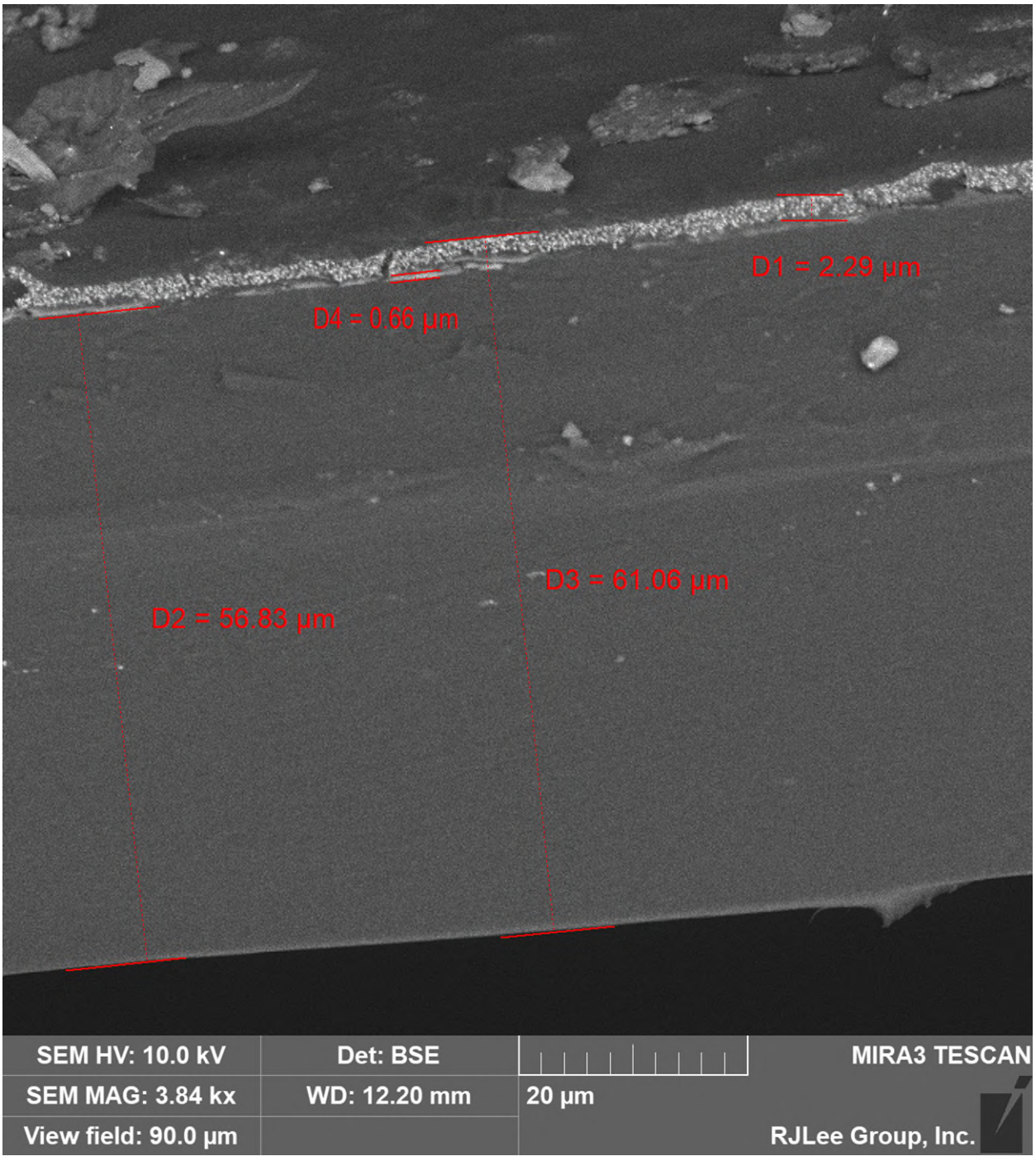


Figure 5d. SEM image of 3191176 cross section.

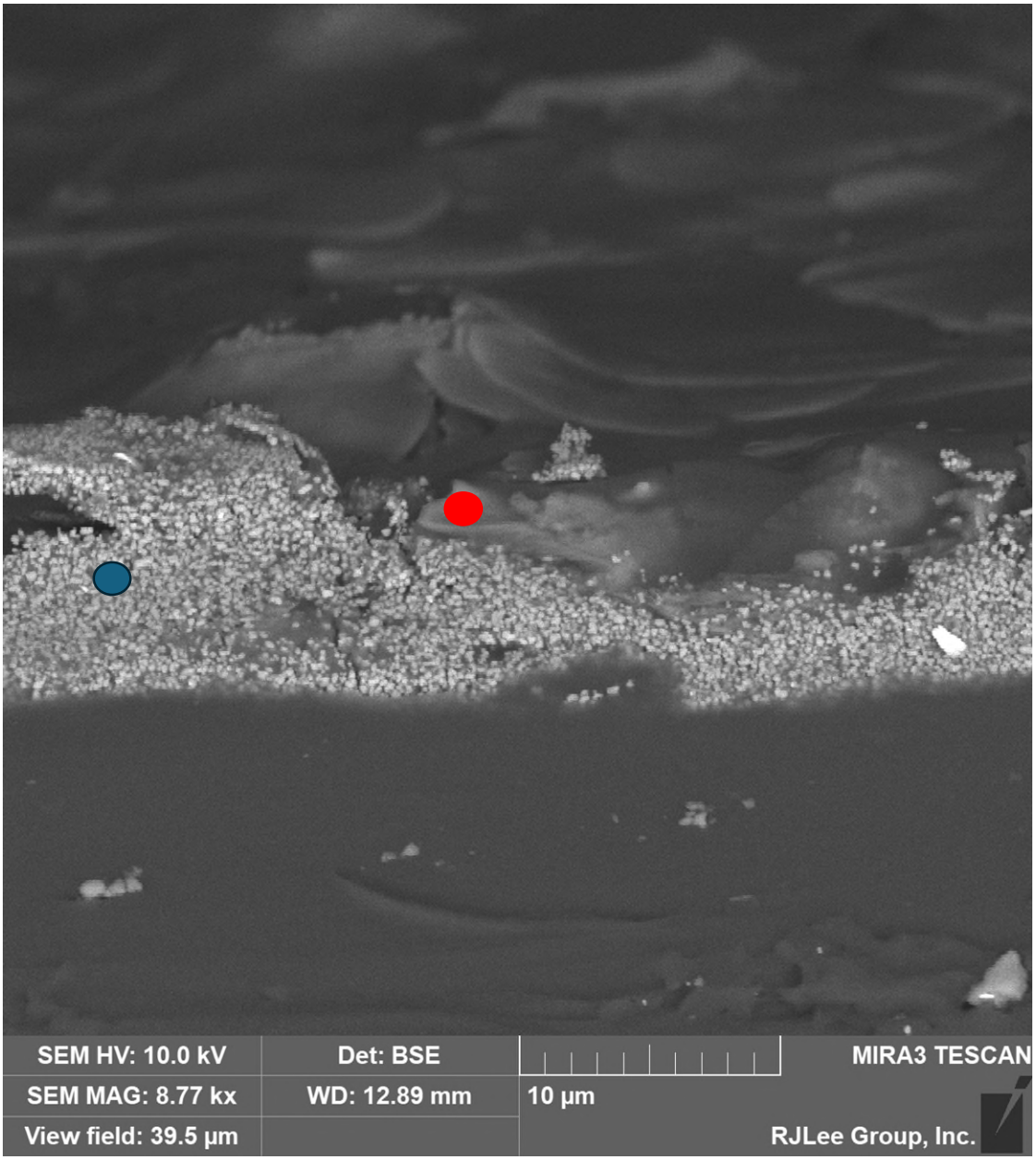


Figure 6a. SEM image of 3191115 cross section. Image is oriented such that the PET film is on the bottom of the image, and the surface at the top of the image is the surface that would contact the substrate.

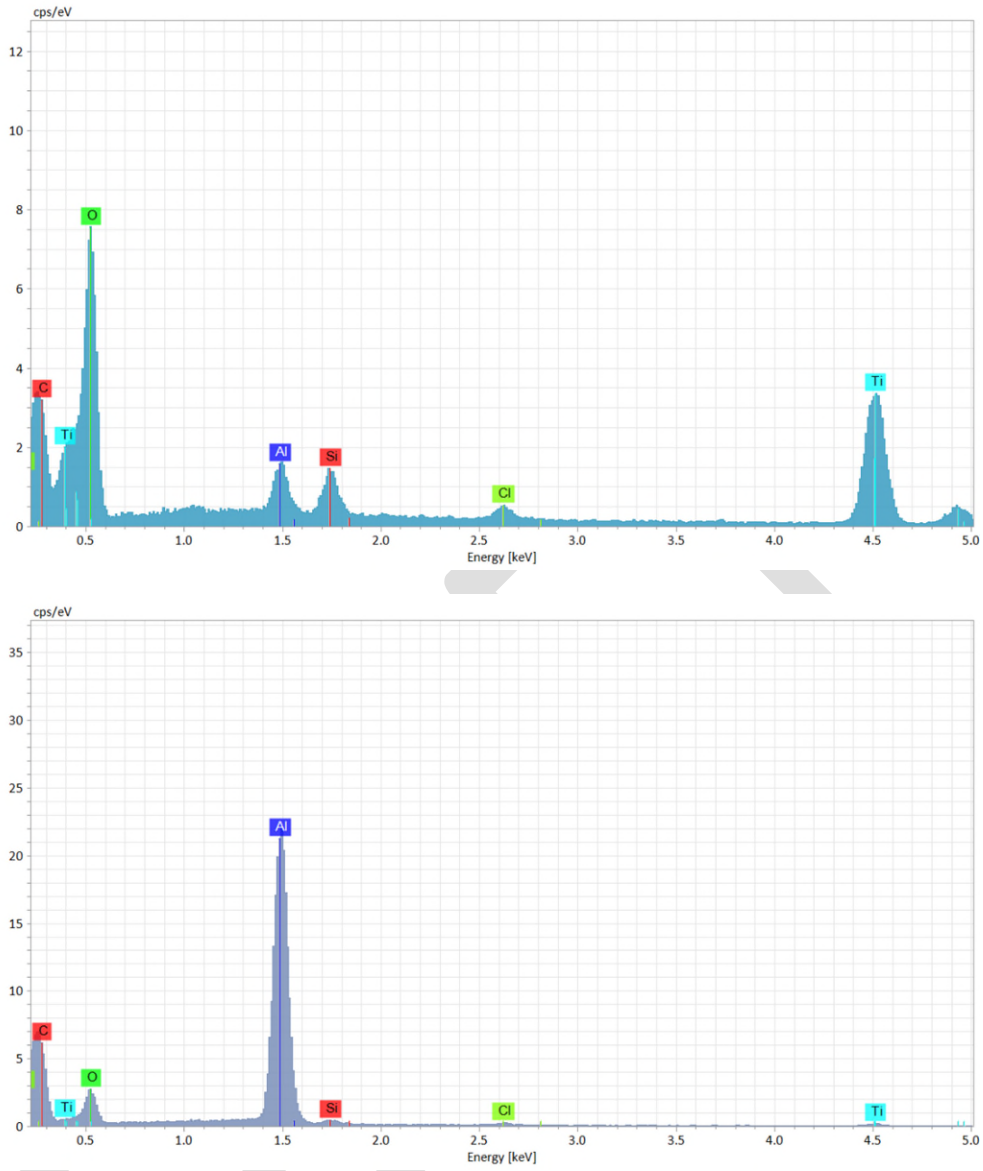


Figure 6a (cont). Top: EDS analysis of 3191115 collected from the area of the green circle, showing titanium dioxide high opacity layer. Bottom: EDS analysis of 3191115 collected from the area of the red circle, showing aluminum light blocking layer.

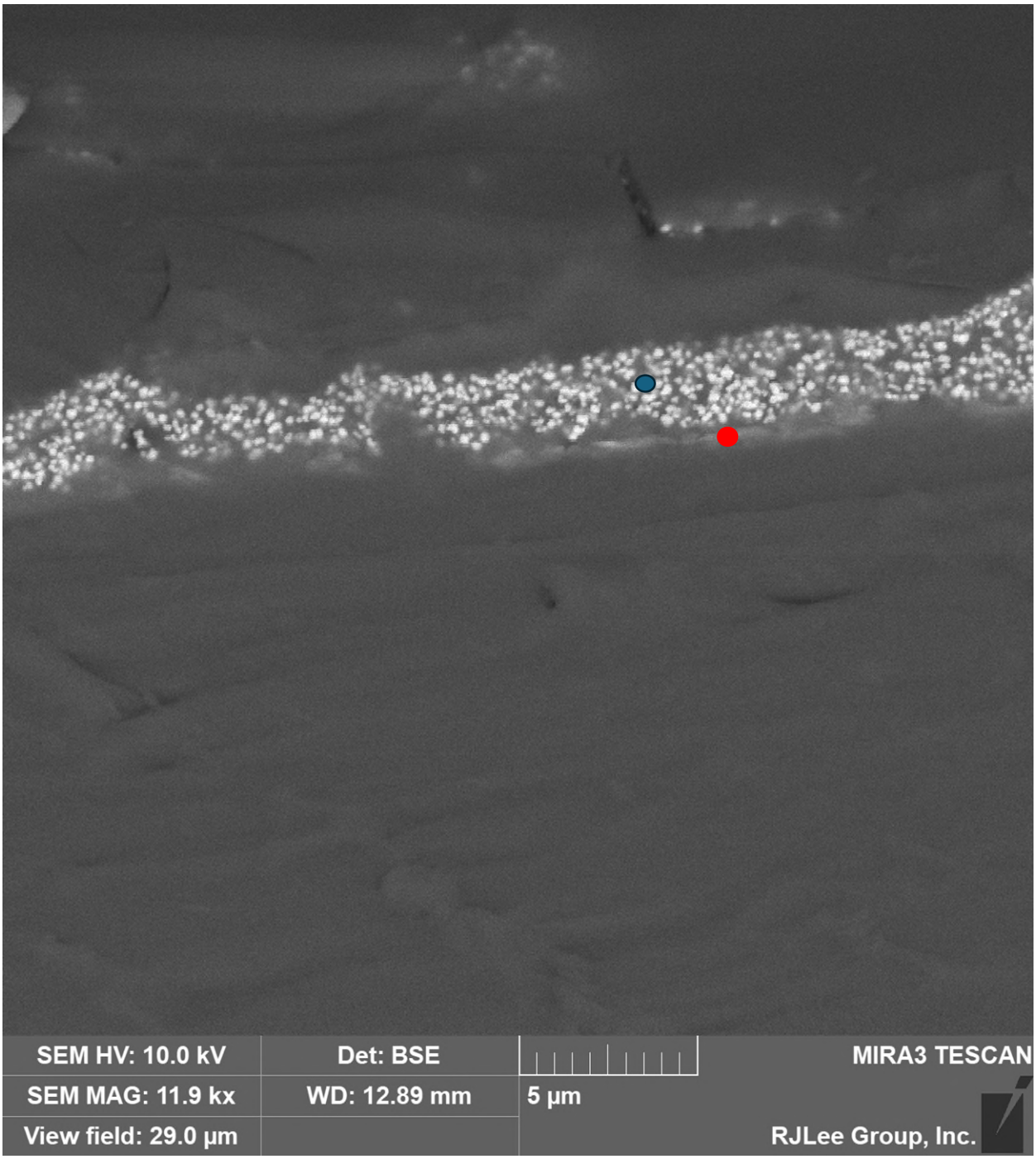


Figure 6b. SEM image of 3191157 cross section. Image is oriented such that the PET film is on the bottom of the image, and the surface at the top of the image is the surface that would contact the substrate.

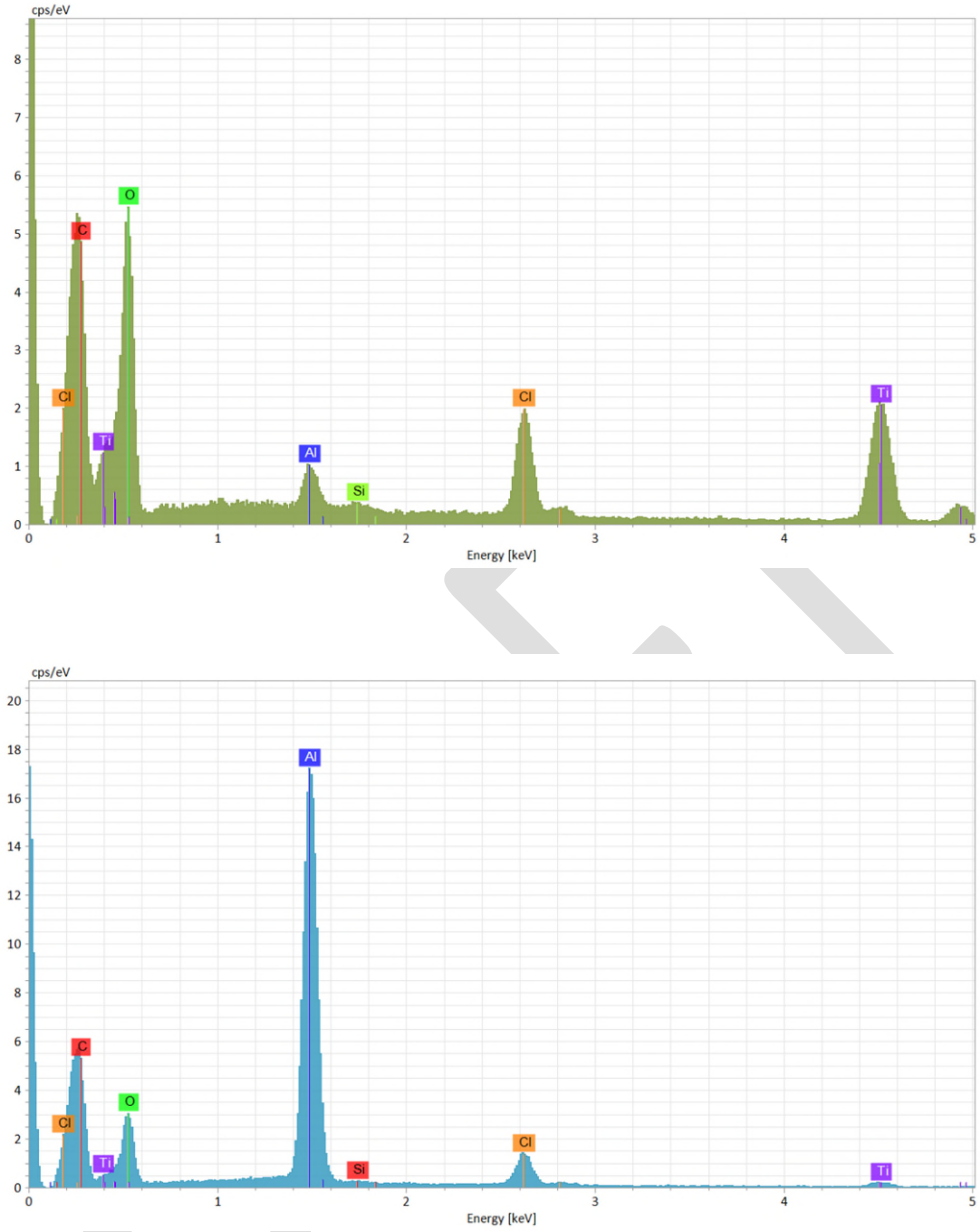


Figure 6b (cont). Top: EDS analysis of 3191157 collected from the area of the green circle, showing titanium dioxide high opacity layer. Bottom: EDS analysis of 3191115 collected from the area of the red circle, showing aluminum light blocking layer.

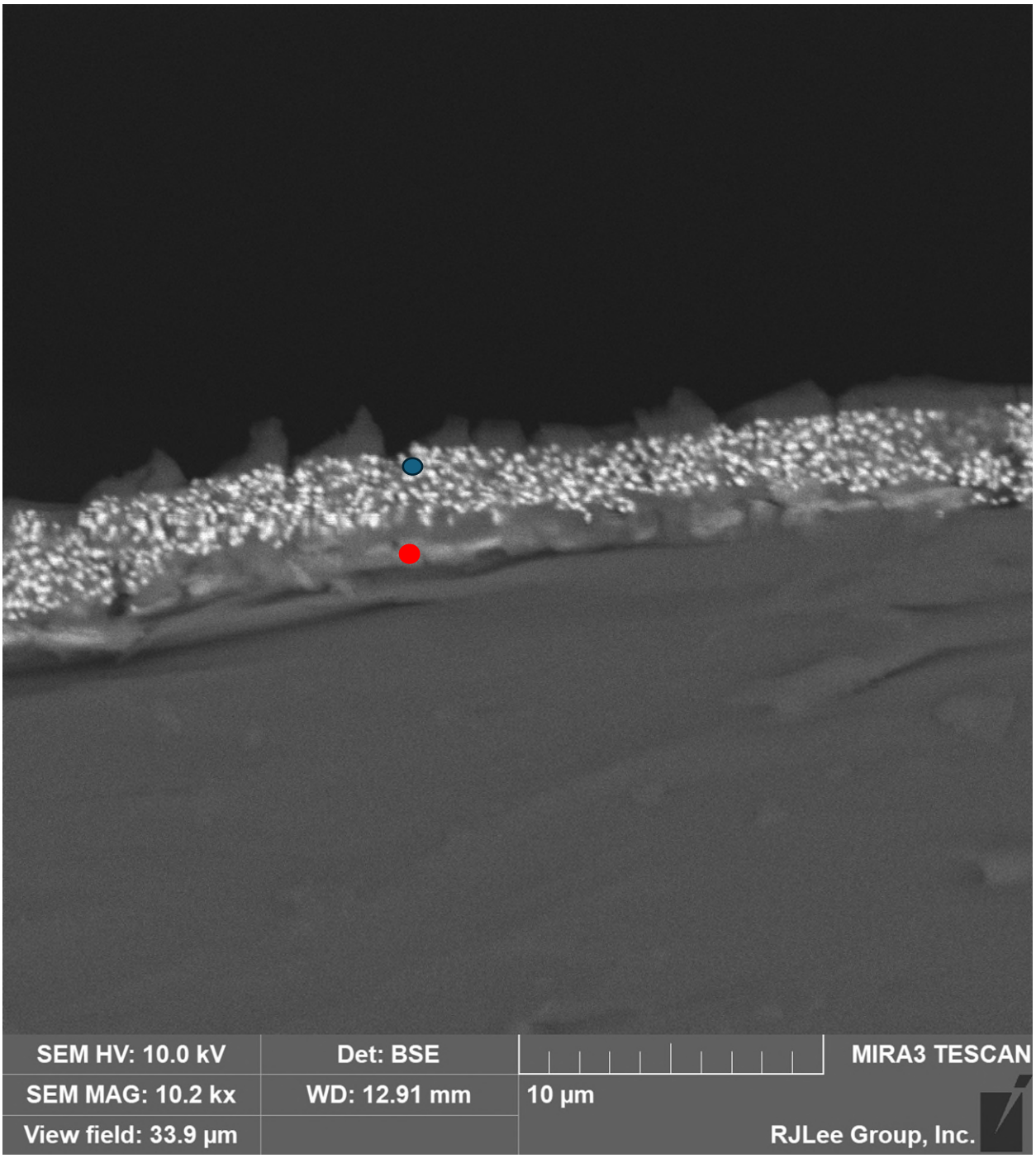


Figure 6c. SEM image of 3191167 cross section. Image is oriented such that the PET film is on the bottom of the image, and the surface at the top of the image is the surface that would contact the substrate.

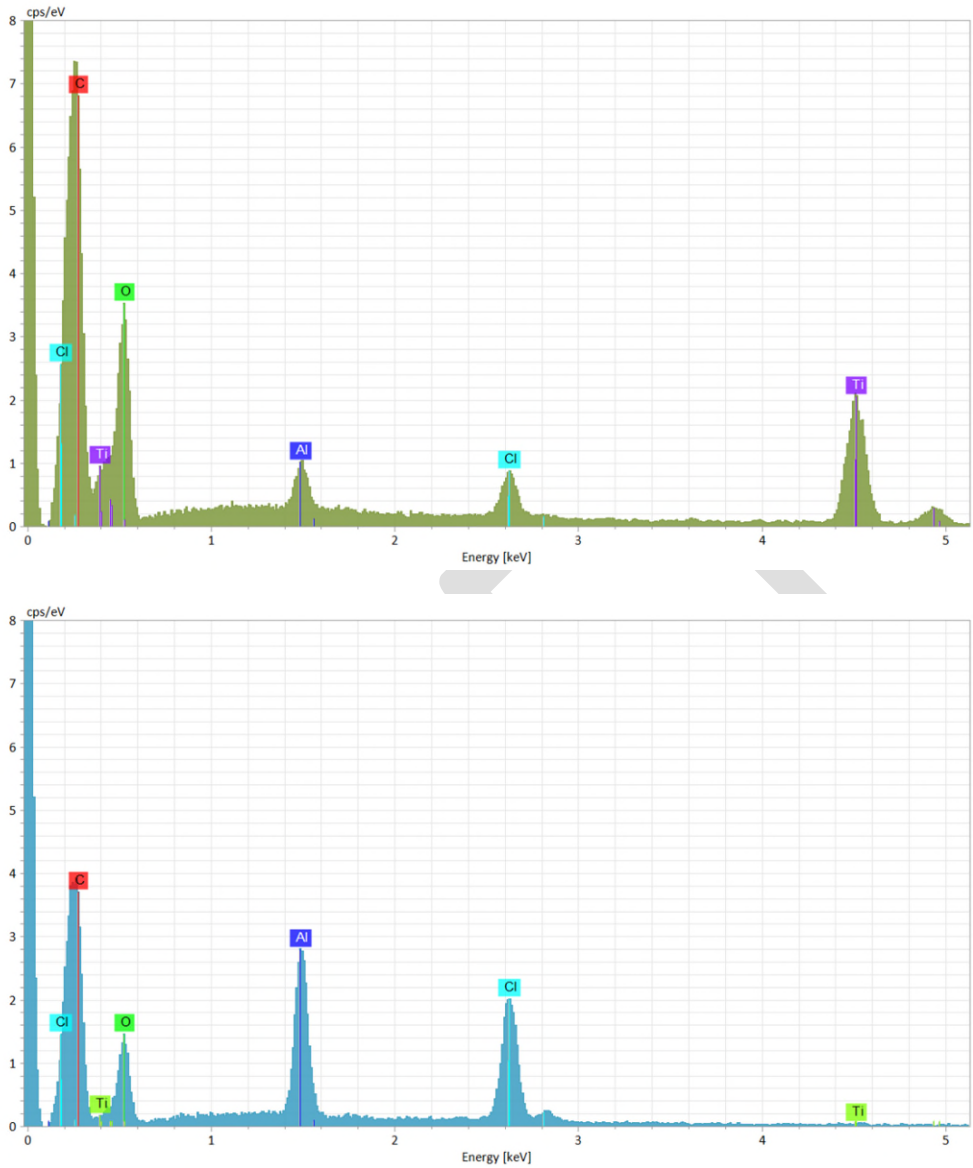


Figure 6c (cont). Top: EDS analysis of 3191167 collected from the area of the green circle, showing titanium dioxide high opacity layer. Bottom: EDS analysis of 3191115 collected from the area of the red circle, showing aluminum light blocking layer.

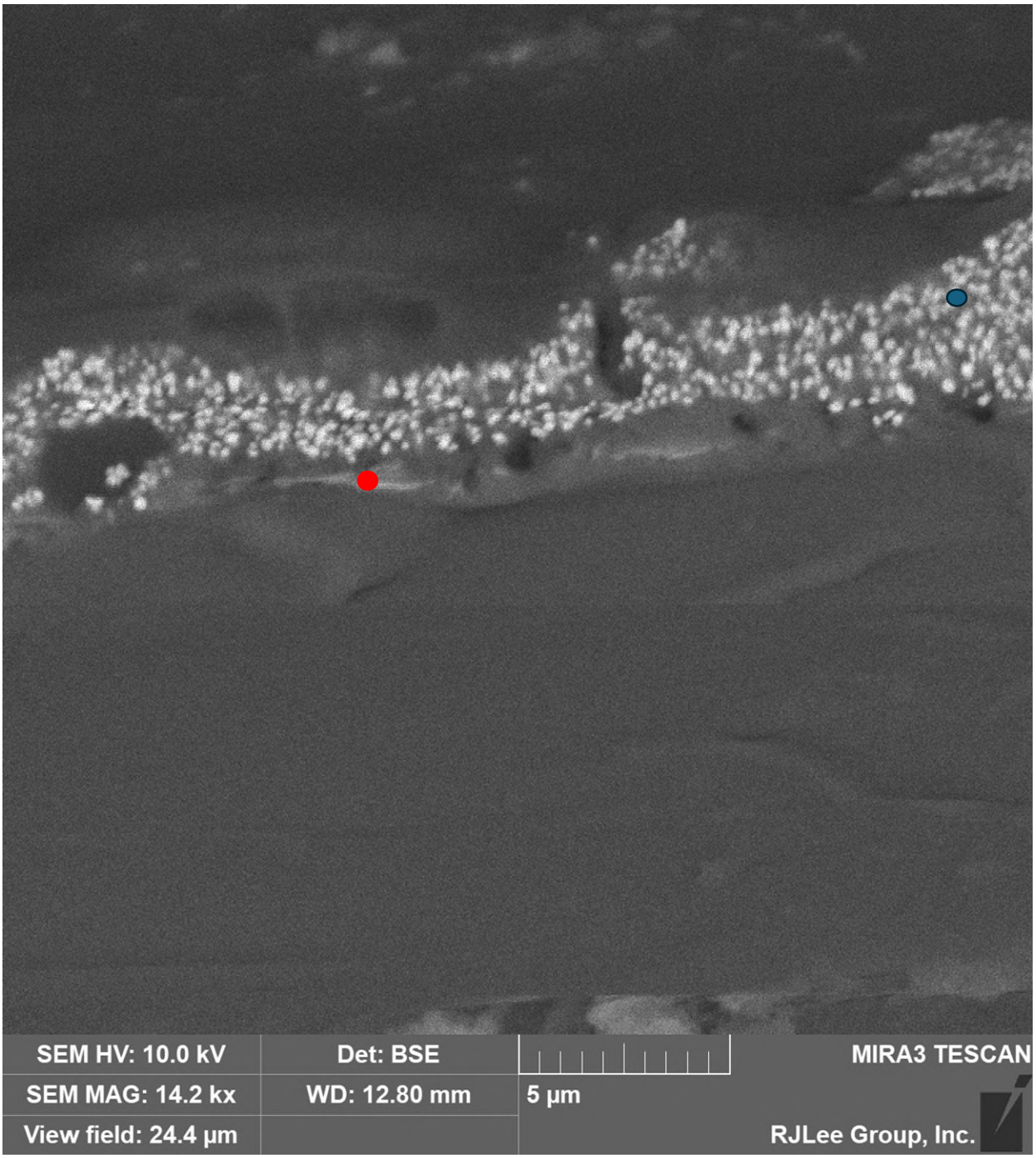


Figure 6d. SEM image of 3191176 cross section. Image is oriented such that the PET film is on the bottom of the image, and the surface at the top of the image is the surface that would contact the substrate.

Figure 6d (cont). Top: EDS analysis of 3191176 collected from the area of the green circle, showing titanium dioxide high opacity layer. Bottom: EDS analysis of 3191115 collected from the area of the red circle, showing aluminum light blocking layer.

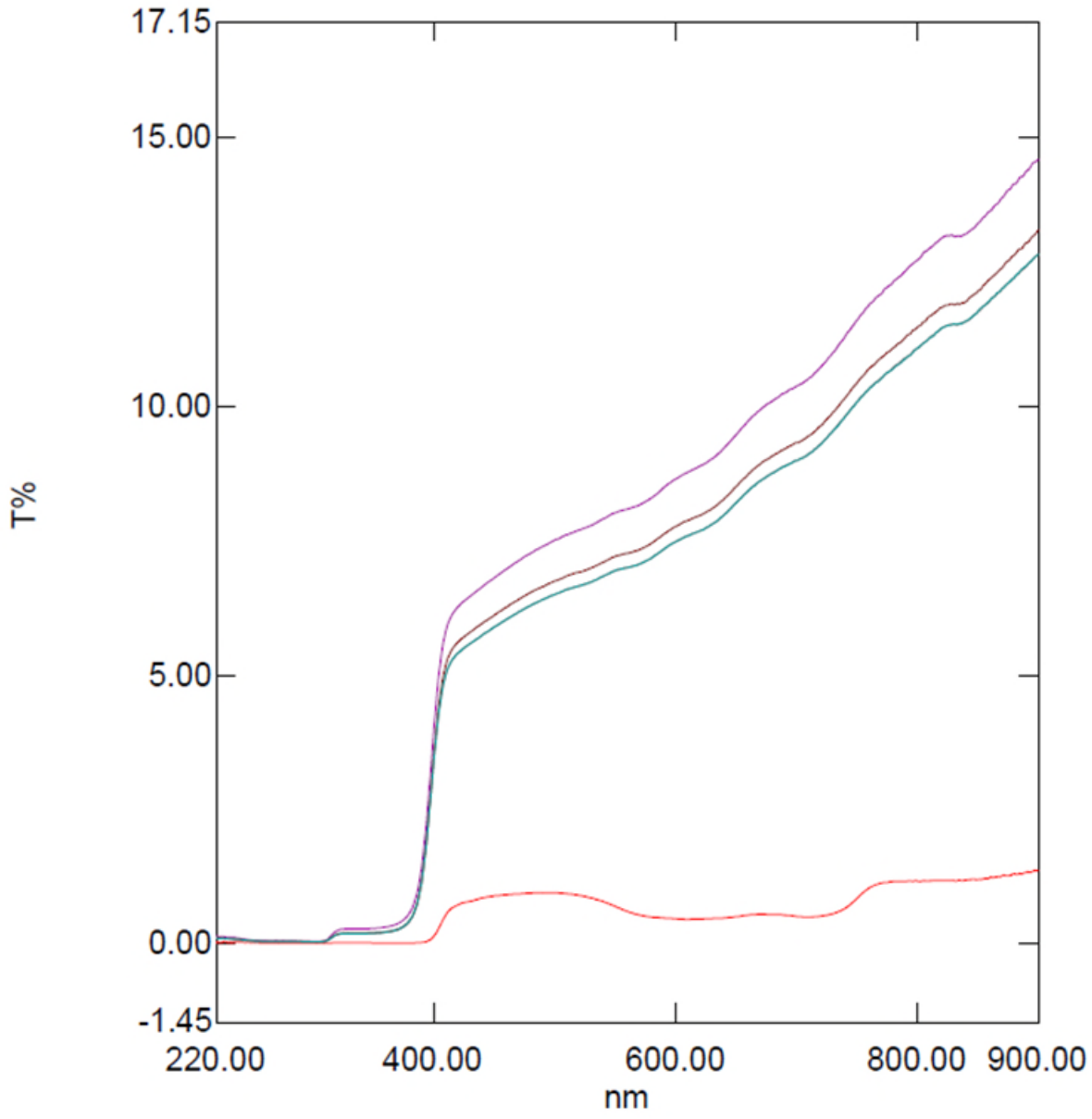


Figure 7. Transmission measurements of 3191115 (red spectra), 3191158 (purple spectra), 3191168 (maroon spectra), and 3191171 (green spectra).

Figure 8. Representative images of 3191115 being shrunk around a 1” pipe.

Figure 8 (cont). Representative image of preshrunk 3191115 cut into approximately one square centimeter flakes.

DRAFT

Figure 9. Representative image of 0.15 grams preshrunk 3191115 cut into approximately one square centimeter flakes and mixed with 5 grams of PET flakes.

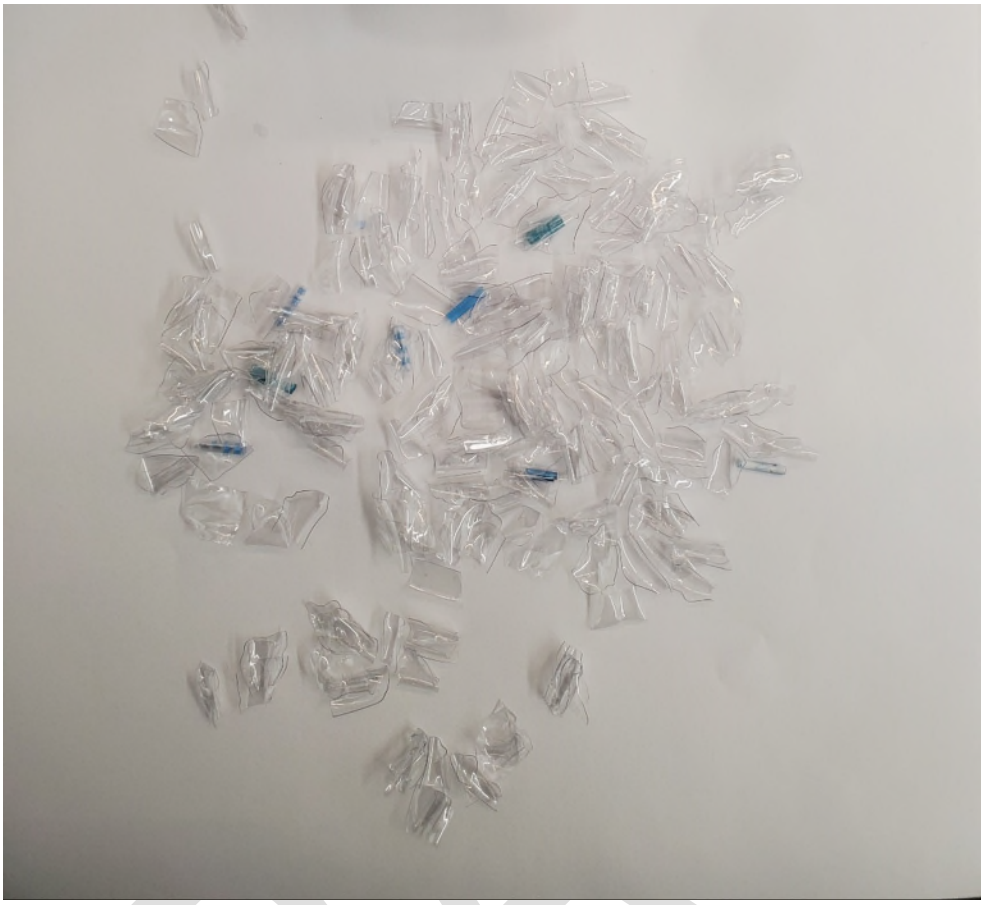


Figure 10. Representative image of 0.15 grams preshrunk 3191115 after caustic wash, warm water wash, float test, and drying.

Figure 11a. Representative image 3191115 after caustic wash, warm water wash, float test, and drying.

DRAFT

Figure 11b. Representative image 3191157 after caustic wash, warm water wash, float test, and drying.

Figure 11c. Representative image 3191167 after caustic wash, warm water wash, float test, and drying.

DRAFT

Figure 11d. Representative image 3191176 after caustic wash, warm water wash, float test, and drying.

Figure 12. Representative image 3191167 warm water wash after sieving.

Figure 13. Top: Raman analysis of the high opacity layer of 3191115 (blue spectra, top), 3191157 (red spectra), 3191167 (green spectra), 3191176 (black spectra), and a titanium dioxide (Rutile, brown spectra, bottom) reference standard pulled from the RUFF data base. Bottom: Comparison of representative Raman analysis of 3191157 (black spectra) to a reference spectra matched to the Wiley KnowItAll library.

Figure 14. Location of each cross section taken from 3191115, 3191157, 3191167, and 3191176 for optical microscopy

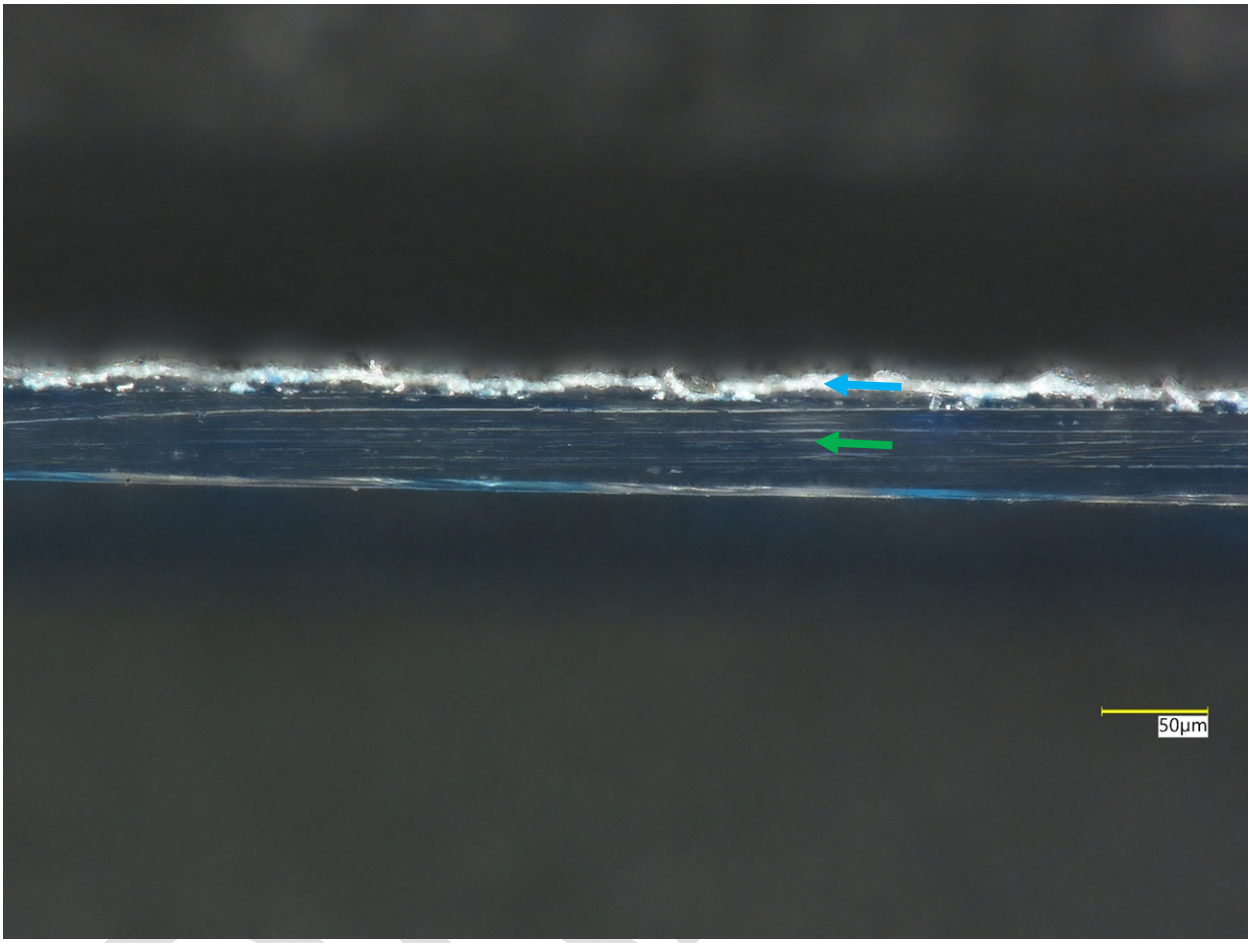


Figure 15a. Optical micrograph of 3191115, PET layer (green arrow), and light blocking layer (blue arrow).

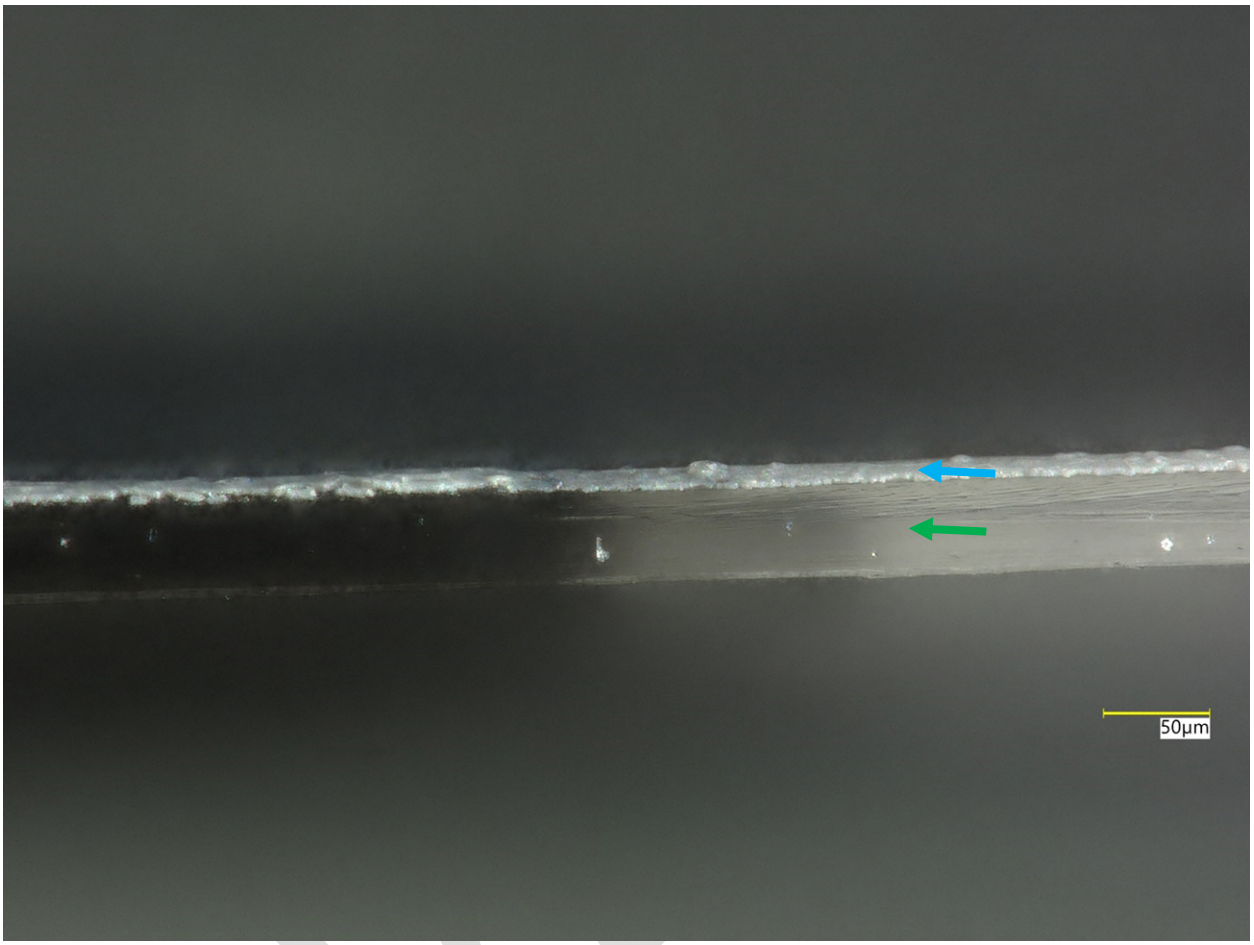


Figure 15b. Optical micrograph of 3191157, PET layer (green arrow), and light blocking layer (blue arrow).

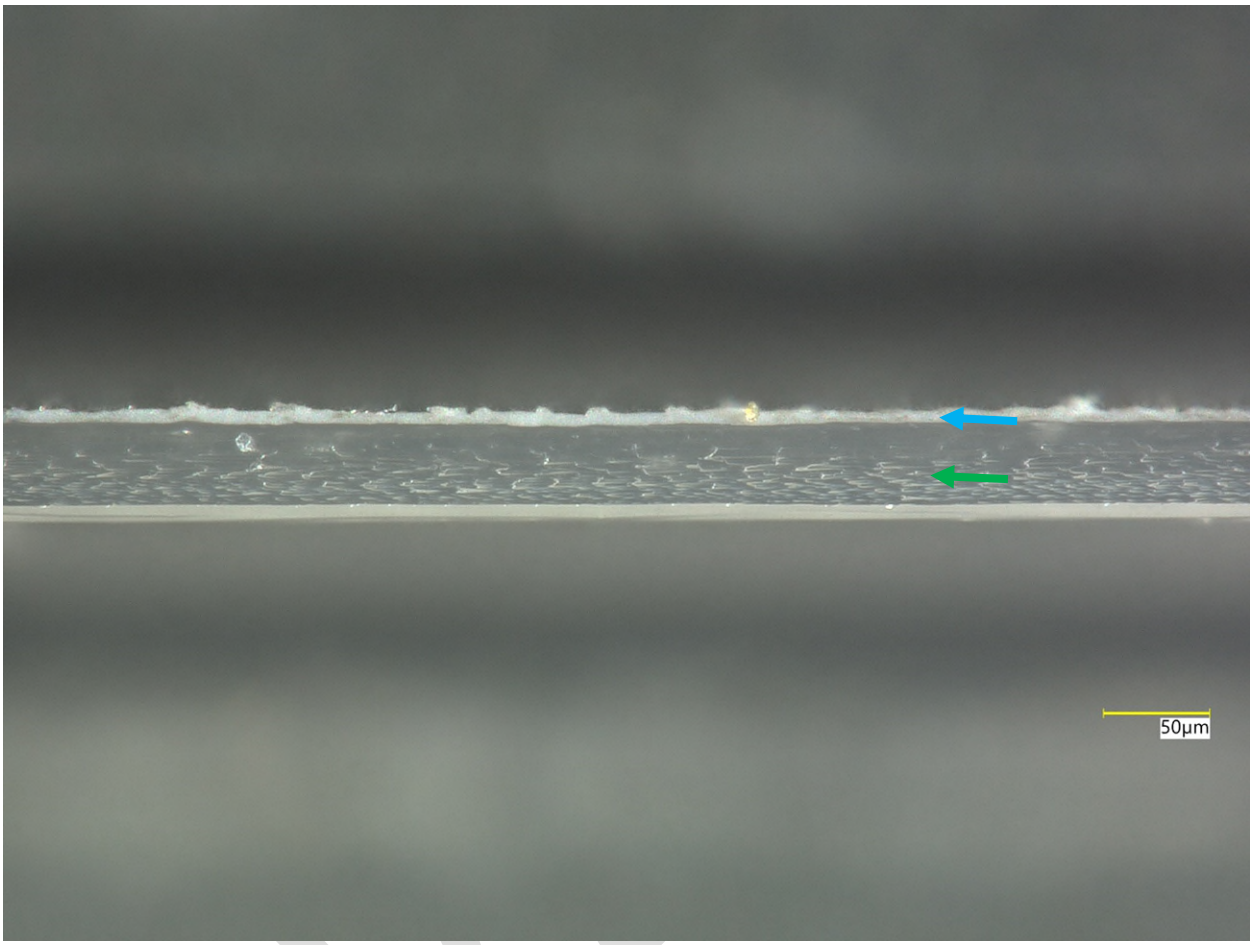


Figure 15c. Optical micrograph of 3191167, PET layer (green arrow), and light blocking layer (blue arrow).

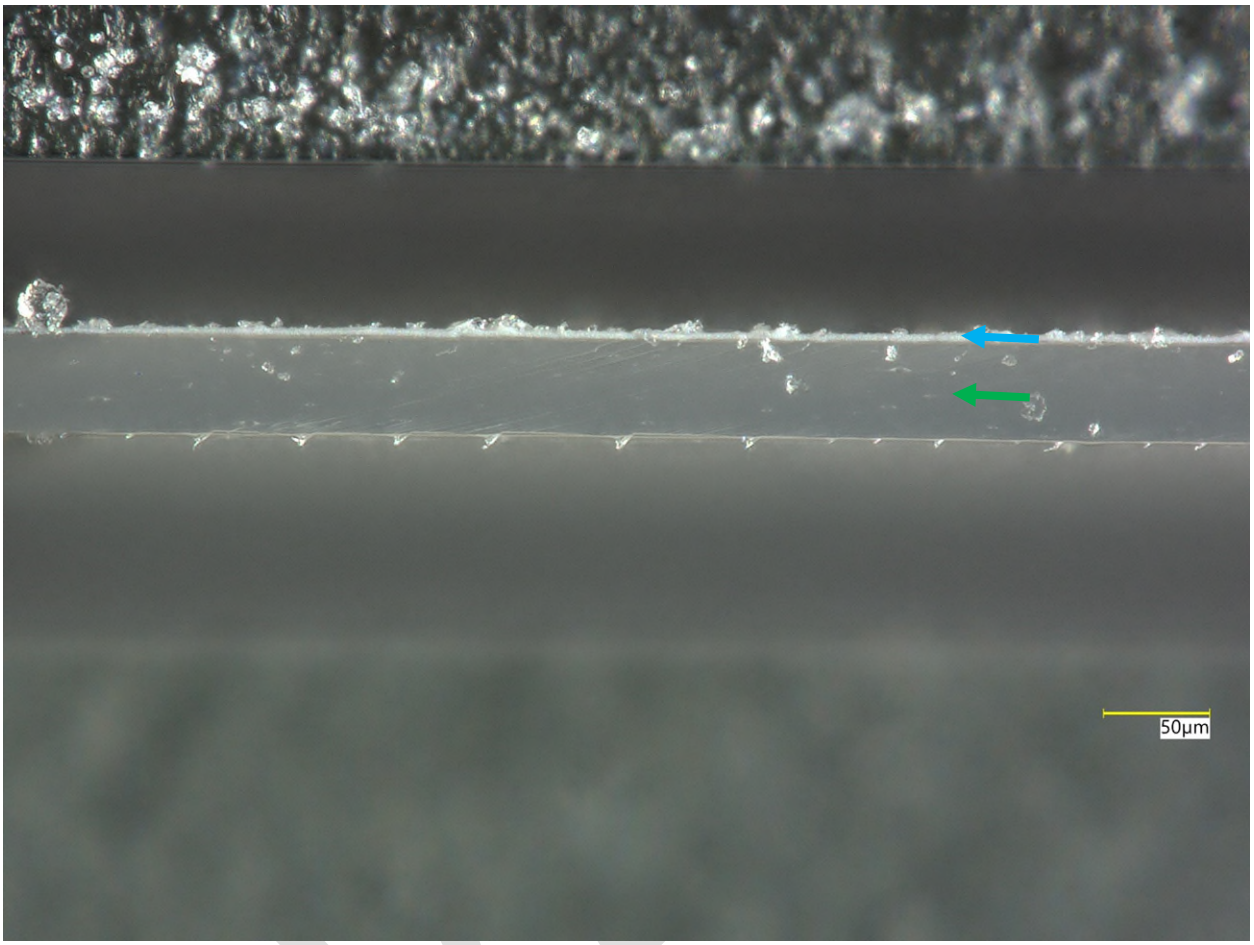


Figure 15d. Optical micrograph of 3191176, PET layer (green arrow), and light blocking layer (blue arrow).

Figure 16. Representative As Received photographs of samples 3191115 and 3191169 representing that all received samples are a tube or sleeve. Close up images show the seam.

Figure 17. Photographs of cut sections of 3191115, 3191158, 3191168, and 3191171 before shrink testing.

Figure 18. Photographs of experimental setup for shrink testing.

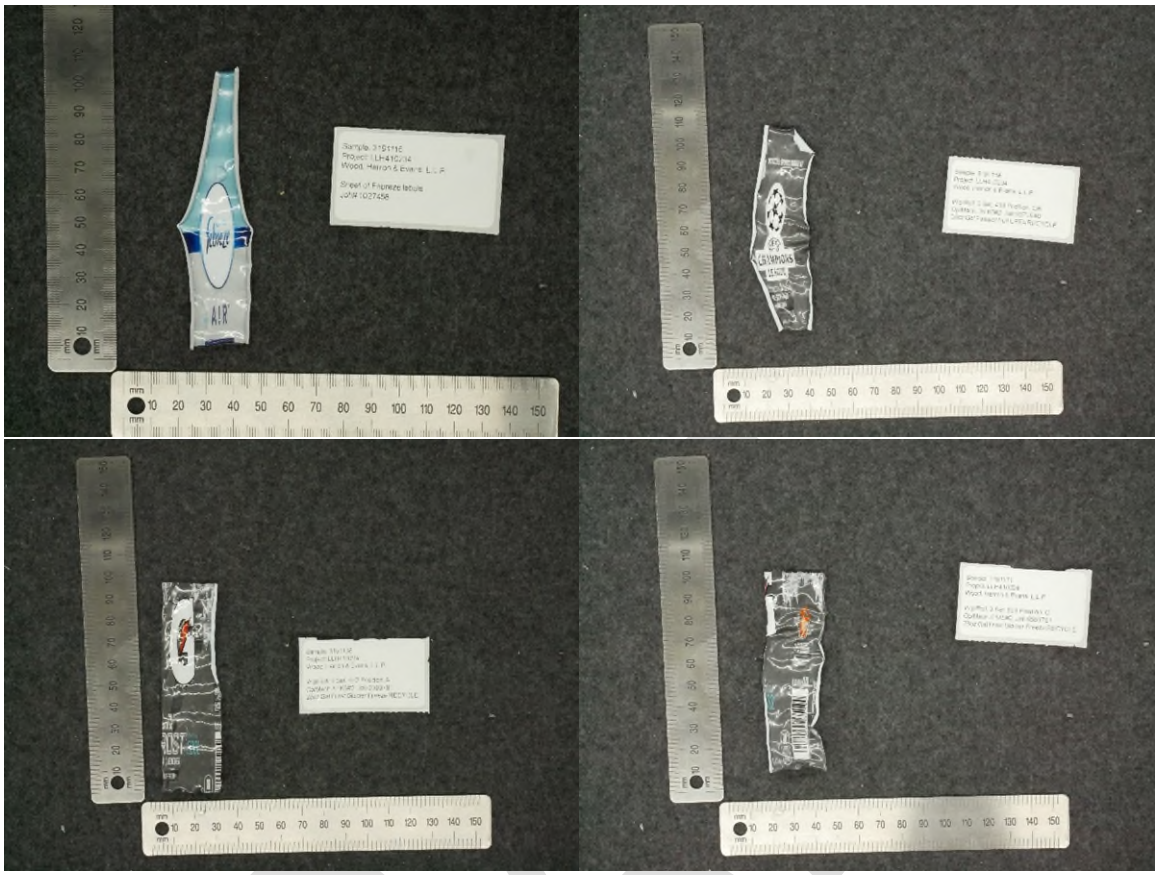


Figure 19. Photographs of cut sections of 3191115, 3191158, 3191158, and 3191171 after shrink testing.