

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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Title: RECYCLABLE HEAT SHRINK FILM FOR RECYCLABLE
CONTAINER

SECOND DECLARATION OF DR. MICHAEL DEIBLE

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I, Dr. Michael Deible, declare that:

I. INTRODUCTION AND SCOPE OF WORK

1. On January 16, 2025, I submitted a First Declaration in PGR2025-00025. *See* EX1014. On October 24, 2025, I submitted a Supplemental Declaration in PGR2025-00025. *See* EX1032. I submit this Second Declaration for the purposes of responding to Patent Owner’s Response to Petition (Paper 34, “POR”) submitted on February 4, 2026, the declaration testimony of Dr. Reitman (EX2012), and the declaration testimony of Dr. Phillips (EX2013).

2. My analysis is based upon my education, training, and experience in the relevant field, including my professional experience and additional experience working with persons of ordinary skill in the art (“POSITA”) as of the earliest alleged priority date of the ’422 Patent. I am familiar with the technology described in the ’422 Patent, and I am also familiar with the knowledge of a POSITA with respect to this technology as of the earliest alleged priority date of the ’422 Patent. In response to the POR, I provide additional information regarding my background, qualifications, and the laboratory testing conducted in connection with the disclosures of the ’422 patent in connection with this PGR, as previously discussed in my First Declaration. I further explain that certain characterizations of my experience, testing, and analysis set forth in the POR are

incomplete and do not accurately reflect the work performed or the opinions expressed in my First Declaration.

3. I am being compensated for my work in connection with this PGR proceeding at my standard hourly rate. My compensation is not in any way contingent on the substance of my opinions or the outcome of this proceeding.

II. EXPERIENCE AND MATERIALS CONSIDERED

4. My analysis set forth in this Second Declaration is based on my education, training, and experience as summarized in my First Declaration and detailed in my CV (*see* EX1014), as well as my review of the '422 patent (EX1001), its prosecution history (EX1002), and prior art references relied upon in this PGR proceeding. I have also reviewed the Patent Owner's Preliminary Response to the Petition (POPR), the POR, each of the accompanying exhibits submitted with the POPR and POR, including the declaration of Dr. Reitman (EX2012) and its appendices, the declaration of Dr. Phillips (EX2013) and its appendices, the deposition transcript of Mr. Bushman (EX2010), the transcript of my own deposition (EX2011), the Board's Decision Instituting PGR ("DI" or "Institution Decision") of the '422 Patent, and the deposition transcripts of Dr. Phillips (EX1048) and Dr. Reitman (EX1049).

5. I have also reviewed the parties' respective definitions of a POSITA, including the definition proposed by Patent Owner and Dr. Phillips. POR, 10-11; EX2013, ¶24. While I continue to believe the definition set forth in my First Declaration (EX1014, ¶24) is correct, the analyses and opinions set forth in my First Declaration, my Supplemental Declaration, and this Second Declaration are the same under either party's proposed definition of a POSITA. Nothing in my analysis turns on the differences between the two definitions.

6. I have also considered Patent Owner's characterization of my experience. POR, 11. I disagree with the suggestion that my background is not relevant to the issues in this proceeding. The disputes raised by the POR concern the identification and characterization of polymer films, pigments, coatings, and layered structures using analytical methods including FTIR spectroscopy, SEM-EDS, Raman spectroscopy, ICP, and UV-Vis spectrophotometry, as well as the design, execution, and documentation of laboratory testing. That is precisely my field. As stated on my CV, I am experienced in multiple analytical techniques, such as those stated above, for both identification of and failure analyses of materials. *see* EX1014. I have conducted failure analyses on a wide range of film failures, including manufacturing defects, such as abnormally applied layers, and in use cases such as delamination of layers.

7. Although this Second 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 Second Declaration, therefore, should be viewed as being incorporated herein in their entireties. I have reviewed the entirety of the references themselves.

III. SUMMARY OF CONCLUSIONS

8. My First Declaration (EX1014) sets forth my analysis and opinions regarding the Challenged Claims (claims 1-19) of the '422 Patent, including my opinions as to why each and every feature of the Challenged Claims of the '422 Patent is provided in the prior art. I understand that Patent Owner, Dr. Phillips, and Dr. Reitman have offered contrary arguments and opinions in the Patent Owner Response and accompanying declarations.

9. This Second Declaration responds to certain arguments and opinions advanced by Patent Owner, Dr. Phillips, and Dr. Reitman, and provides additional explanation regarding the opinions and conclusions set forth in my First Declaration. I have noted that the POR does not address, much less rebut, much of the analysis I provided in my First Declaration. Indeed, rather than

squarely confronting the substantial evidence of unpatentability offered in my First Declaration, Patent Owner, Dr. Phillips, and Dr. Reitman sometimes mischaracterize my testimony, the disclosure of the '422 Patent, and the cited prior art, as I discuss in more detail below. As I previously explained with reference to the applied prior art, each and every feature of the Challenged Claims of the '422 Patent is provided in the prior art. I do not repeat all of that analysis here. Rather, this declaration is intended to respond to particular arguments presented in the POR.

10. Identification of Samples. To assist the Board, and in response to Patent Owner's comments regarding which samples correspond to which label (*see* POR, 15 n.1, 27 n.2), the following table identifies each sample number referenced in my First Declaration and the label to which it corresponds, as set forth in my Supplemental Declaration (EX1032).

Sample Number	Label Type
3191115	Febreze Label
3191157	Gatorade Label
3191158	Gatorade Label
3191167	Gatorade Label

3191168	Gatorade Label
3191169	Gatorade Label
3191171	Gatorade Label
3191176	Gatorade Label

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

11. As reflected in the table above, my First Declaration presented data for both Gatorade Label samples and a Febreze Label sample. With respect to Ground 1, the Gatorade Label samples alone – independent of any data collected from sample 3191115 – establish each limitation of the challenged claims, as set forth in my First Declaration and as further explained below and in response to the POR. My opinions under Ground 1 rest on the Gatorade sample data.

12. As explained in my First Declaration, Ground 1 demonstrates that claims 1-3 and 5-19 of the '422 Patent are anticipated by the Gatorade Label under 35 U.S.C. § 102. *See* EX1014, § VIII.C. I understand that Patent Owner disputes this conclusion and contends that the Gatorade Label does not disclose certain limitations of those claims. In this Second Declaration, I respond to the arguments and opinions advanced by Patent Owner in the POR and explain why they do not alter the opinions set forth in my First Declaration.

1. Claim 1

[Claim 1] ...a heat shrink film comprising polyethylene terephthalate (PET) and having a first surface and a second surface opposite of the first surface....:

13. In my First Declaration, I conducted an element-by-element analysis of each claim limitation of claim 1 against the Gatorade Label, including the claim limitation “a heat shrink film comprising polyethylene terephthalate (PET) and having a first surface and a second surface opposite of the first surface.” See EX1014, ¶¶ 59-64. Patent Owner contends that “[n]either Petitioner nor Dr. Deible identify a ‘first surface’ or ‘a second surface opposite of the first surface.’” POR, 16.

14. In response, I disagree. As explained in my First Declaration, I confirmed that the Gatorade Label includes a PET heat shrink film through FTIR analysis and further prepared cross-sections of the label to evaluate the structure and thickness of the PET film and associated layers. EX1014, ¶¶ 60-64. The cross-sectional images presented in Figures 5 and 6 depict a PET film layer having a measurable thickness. EX1014, ¶¶ 63-66. A POSITA would understand that the PET film necessarily includes two opposing surfaces. Thus, once the PET film is identified in the cross-sectional images, the existence of a first surface and a second surface opposite the first surface necessarily follows.

15. In addition, my First Declaration expressly measured the thickness of the PET film and concluded that "all samples have a heat shrink PET film

thickness of approximately 40-60 microns." EX1014, ¶ 64. As one example, Figure 5c (reproduced below with my annotations) depicts a thickness measurement (D3) of the PET film for sample 3191167 extending between a first surface of the PET film, indicated by a first horizontal red line, and a second surface opposite the first surface, indicated by a second horizontal red line.

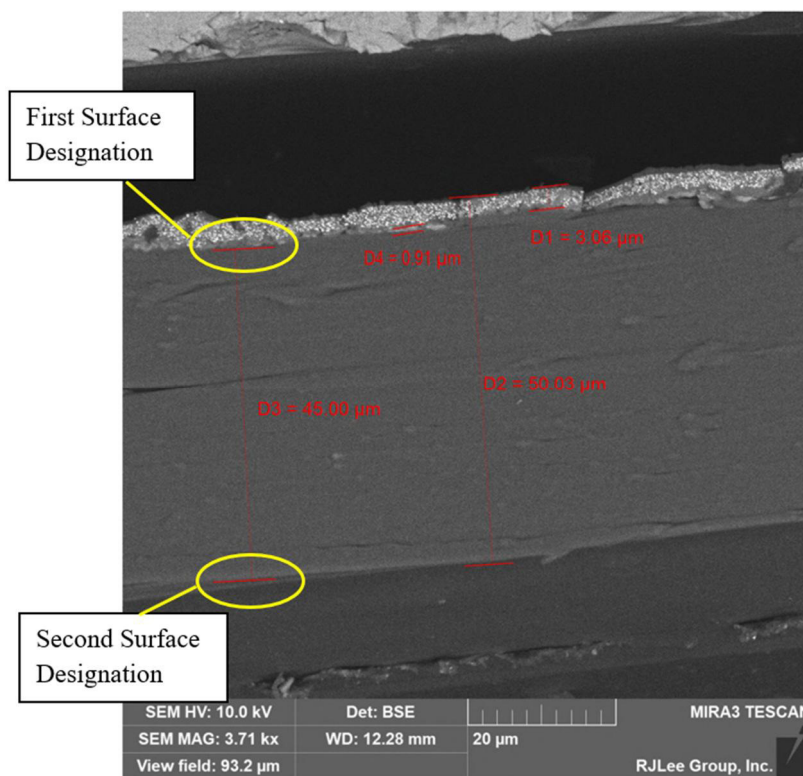


Figure 5c. SEM image of 3191167 cross section.

16. With respect to Figure 5c, D1 is the thickness measurement of the high opacity layer of sample 3191167, D2 is the thickness measurement of the entire label of sample 3191167, D3 is the thickness measurement of the PET film

of sample 3191167, and D4 is the thickness measurement of the light blocking layer of sample 3191167.

17. A thickness measurement necessarily represents the distance between opposite surfaces of the PET film. Accordingly, by identifying and measuring the thickness of the PET film, my First Declaration necessarily identified the two opposing surfaces of the PET film from which the measurement was obtained. A POSITA would have readily understood from this analysis that the PET film possessed a first surface and a second surface opposite the first surface between which the thickness of the PET film was measured. I further note that Patent Owner does not dispute my PET film thickness measurements. Patent Owner does not contend that the measured thickness was incorrect, that the PET film boundaries were improperly identified, or that some other portion of the label was measured. The thickness of the PET film could not have been measured without first identifying the opposite surfaces that define that thickness.

18. Further, my First Declaration provided orientation information for the cross-sectional images. Specifically, I explained that the images were oriented such that the PET film was positioned at the bottom of the image and that the surface at the top of the image was the surface that would contact the substrate. EX1014, ¶ 66; Appendix B, Figures 6b-6d. Accordingly, my First Declaration identified not only the PET film itself and its measurable thickness, but also the

orientation of the film relative to the coating layers disposed thereon, including the surface that is configured to contact the substrate.

19. The '422 Patent itself supplies the mapping between the structure I identified and the claim language. The '422 Patent explains: "[t]he shrink film has a first surface and a second surface opposite of the first surface. When the label is applied onto a container (e.g., a bottle), the first surface may be the side facing the container and the second surface may face the outside of the container." EX1001, 6:42-47. The '422 Patent further explains that "adjacent" "is used here to indicate which ... side of the label the layer is closest." *Id.* Applying the '422 Patent's own usage to the structures identified in my First Declaration confirms that, for each of Gatorade samples 3191157, 3191167, and 3191176, the first surface of the PET heat shrink film is the container-facing surface – i.e., the surface adjacent the printed coating stack (the aluminum light blocking layer and the titanium dioxide high opacity layer) shown in Figures 5b–5d and 6b–6d of my First Declaration, which is the surface oriented toward the top of each image ("the surface that would contact the substrate"). The second surface is the opposite, outward-facing surface of the PET film, shown at the bottom of each image. This is the same mapping reflected in my First Declaration's orientation descriptions; I state it here expressly using the terms "first surface" and "second surface" in response to Patent Owner's criticism.

20. Patent Owner's argument therefore appears to be directed not to whether the Gatorade Label includes a PET film having two opposing surfaces, but rather to whether those surfaces were expressly labeled as the "first surface" and "second surface." In my opinion, no such express labeling is required for a POSITA to recognize the claimed structure. And, in any event, the express identification is now set forth in ¶ 15 above.

21. Moreover, my First Declaration explained the arrangement of the coating layers relative to the PET film. *See* EX1014, ¶¶ 65-68. Based on the cross-sectional images and the orientation information provided therein, a POSITA would understand that the surface of the PET film adjacent to the coating layers corresponds to the recited "first surface," while the opposite side of the PET film corresponds to the recited "second surface opposite of the first surface." The relative arrangement of the PET film and coating layers is shown in the cross-sectional images and accompanying descriptions. *See* EX1014, ¶¶ 63-68; Appendix B, Figures 5-7.

22. I understand that the standard for anticipation may be satisfied if the prior art enables a POSITA to recognize the claimed invention, even without exhaustive detail. As set forth above, a POSITA reviewing the cross-sectional analyses and images of the Gatorade Label would have readily recognized the PET heat shrink film having a first surface and a second surface opposite of the

first surface. My First Declaration identified the PET film through FTIR analysis, measured the thickness of that PET film, and described the orientation of the PET film relative to the coating layers. *See* EX1014, ¶¶ 60-66.

23. Accordingly, it remains my opinion that the Gatorade Label discloses "a heat shrink film comprising polyethylene terephthalate (PET) and having a first surface and a second surface opposite of the first surface," as recited in claim 1. Patent Owner's criticism is directed to the absence of an express designation of those surfaces, rather than the absence of the claimed structure itself.

[Claim 1] ... a light blocking layer disposed adjacent the first surface and comprising a light blocking component....:

24. In my First Declaration, I conducted an element-by-element analysis of each claim limitation of claim 1 against the Gatorade Label, including the claim limitation "a light blocking layer disposed adjacent the first surface and comprising a light blocking component." *See* EX1014, ¶¶ 65-66. Patent Owner mischaracterizes my findings, stating in part that "the descriptions of FIGS. 6b-d state the '[i]mage 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,'" but that "substrate" does not appear in the claims and neither Petitioner nor I define "the substrate" or explain how it relates to any claimed "surface." POR, 17-18.

25. In response, I disagree with Patent Owner's characterization of my findings. As set forth above, a POSITA reviewing the analyses and disclosures in my First Declaration would have readily understood that the Gatorade Label's PET film includes opposing surfaces as recited in claim 1. Indeed, as Patent Owner acknowledges, my First Declaration expressly states that the cross-sectional images were oriented such that the PET film was positioned at the bottom of the image and that the surface at the top of the image was the surface that would contact the substrate. *See* EX1014, Appendix B, Figures 6a-6d. Thus, my First Declaration identified the orientation of the PET film relative to the remainder of the Gatorade Label structure. I further explained that "[f]or samples 3191157, 3191167, and 3191176, the aluminum light blocking layer is between the PET layer and the high opacity layer." EX1014, ¶ 66. Figures 6b through 6d include a red circle that identifies the "aluminum light blocking layer." EX1014, Appendix B, Figures 6b–6d (cont.). The cross-sectional analyses in my First Declaration demonstrate that the light blocking layer is disposed between the PET layer and the high opacity layer and thus adjacent to one side of the PET film – the first surface, as identified in ¶ 15 above. Because the light blocking layer is the printed layer nearest the container-facing (first) surface of the PET film for these samples, it is "disposed adjacent the first surface" under the specification's express usage of

"adjacent" (indicating "which ... side of the label the layer is closest"). EX1001, 52-57.

26. I further note that the use of the term "substrate" in my First Declaration is consistent with the usage of that term in the '422 Patent itself and with how a POSITA would understand that term. The '422 Patent explains that "[s]hrink films are typically polymeric films that are applied over or around a substrate or, for example, a container (e.g., a bottle, jar, tube, or the like) or multiple containers (e.g., a multipack of containers)." EX1001, 9:19-22. Thus, a POSITA would have understood my reference to the "surface that would contact the substrate" to refer to the side of the label oriented toward the underlying container. Patent Owner's criticism therefore does not identify any deficiency in the disclosed structure or layer arrangement. Rather, it challenges the terminology used to describe the orientation of the cross-sectional images. In my opinion, the disclosures in my First Declaration were sufficient to demonstrate, and a POSITA would envisage therefrom, that the Gatorade Label includes "a light blocking layer disposed adjacent the first surface and comprising a light blocking component," as recited in claim 1.

[Claim 1] ...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 200nm to 900nm

27. In my First Declaration, I opined that the Gatorade Label satisfied the claim limitation "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." EX1014, ¶¶ 67-69. Patent Owner contends that my analysis is deficient because I did not test the entirety of the Gatorade Label and did not identify the precise regions of the label from which the transmittance measurements were obtained. *See* POR, 19-21. Patent Owner interprets the claims as requiring that the entire shrink label, evaluated as an area-weighted average across all of its regions – including regions that may bear no light blocking layer at all – block at least 80% of incident light across the recited wavelength range.

28. In response, I disagree. The plain language of claim 1 does not require that the entirety of the shrink label block at least 80% of incident light. Rather, claim 1 recites "a light blocking layer" that is "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." EX1001, cl. 1. The claim language does not use the term "entire" and does not require that every portion of the shrink label independently satisfy the recited threshold. Nor does the claim require that the light blocking layer itself be deposited continuously across, or extend over, the entirety of the shrink label. In my opinion, a POSITA would understand that the recited light-blocking functionality is attributable to the claimed light blocking

layer and is satisfied where that light blocking layer is present and performing its intended function.

29. This understanding is consistent with the specification of the '422 Patent. The specification expressly states that "[a]pplication of the light blocking coating composition onto the shrink film or onto a layer on the shrink film forms a light blocking layer" and that "[t]he light blocking layer need not be constant, continuous or complete across the entirety of the shrink film." EX1001, 15:43-50. The specification further explains that, "[i]n some embodiments, the high opacity layer forms a pattern of discrete dots of light blocking component." *Id.* The specification includes parallel statements for the other printed layers: "[t]he high opacity layer need not be constant, continuous, or complete across the entirety of the shrink film," and "[t]he indicia layer need not be constant, continuous, or complete across the entirety of the shrink film." EX1001, 13:8-12. Thus, the '422 Patent expressly contemplates embodiments in which the light blocking layer is not present across the entirety of the shrink film, and a POSITA therefore would not understand claim 1 to require that every portion of the shrink label independently block at least 80% of incident light – much less that regions of the label bearing no light blocking layer be averaged against the performance of the light blocking layer itself.

30. The '422 Patent also explains that "[t]he amount of light blocked by the label may be measured using a UV-Vis spectrophotometer, such as the Shimadzu model UV-2600i." EX1001, 13:45-47; *see also* 23:24-26; 24:33-36; 25:56-59. The '422 Patent does not describe testing the entirety of a shrink label, averaging measurements across the entirety of the shrink label, or otherwise requiring that the entire shrink label be evaluated as Patent Owner suggests. Nor does the specification describe placing an entire shrink sleeve label into the instrument and measuring the transmittance of the entirety of the shrink label. Rather, the '422 Patent contemplates evaluating small samples placed in the spectrophotometer to determine whether the claimed transmittance characteristics are achieved where the light blocking layer is present. Indeed, every working Example in the '422 Patent proceeds exactly this way: Examples 1-5 report percent-light-blocked values measured by UV-Vis through printed sample constructions containing the light blocking layer. EX1001, Examples 1-5. Nowhere does the '422 Patent measure, calculate, or report an area-weighted average across an entire commercial label, and nowhere does the '422 Patent discount measured light blocking by the fraction of label area the light blocking layer covers. Consistent with the '422 Patent, a POSITA would understand that representative portions of the shrink label containing the light blocking layer may

be evaluated to determine whether the recited light-blocking performance is achieved.

31. Patent Owner's interpretation of this claim limitation would exclude embodiments expressly disclosed in the specification of the '422 Patent. Specifically, if claim 1 required that the entirety of the shrink label block at least 80% of incident light, as Patent Owner suggests, embodiments in which the light blocking layer is not "constant, continuous or complete across the entirety of the shrink film," including embodiments utilizing discrete dots of light blocking component, would fall outside the scope of the claims despite being expressly described in the '422 Patent. Likewise, every shrink sleeve label necessarily includes a seam region, and commercial shrink sleeve labels routinely include registration zones and other regions of reduced or no ink coverage; under Patent Owner's area-weighted reading, such labels – including the embodiments of the '422 Patent itself – could fail the limitation based on regions that bear no light blocking layer. In my opinion, a POSITA would not adopt Patent Owner's interpretation because it would exclude embodiments expressly disclosed in the '422 Patent, and nothing in the claim language requires such an exclusion.

32. Patent Owner further contends that I failed to identify the regions of the Gatorade Label from which the transmittance measurements were obtained. POR, 18. In clarification of paragraph 68 of my First Declaration, the portions of

the Gatorade Label that were tested were the silver portions of the label, which contained the light blocking layer identified in my analysis. *See* EX1014, ¶¶ 65-69. Specifically, the transmission measurements reported in Figure 7 of my First Declaration were collected from silver-ink-bearing portions of Gatorade samples 3191158, 3191168, and 3191171, and Febreze sample 3191115. Each Gatorade Label sample independently blocked at least 80% of incident light across the measured range; accordingly, the limitation is established by the Gatorade Label data alone, without reliance on sample 3191115. Consistent with my understanding of claim 1, I evaluated those portions of the Gatorade Label containing the light blocking layer and concluded that they blocked at least 80% of incident light having wavelengths from 220 nm to 900 nm. *See* EX1014, ¶¶ 67-69.

33. Dr. Reitman's contrary analysis does not change my opinion. Dr. Reitman measured the transmittance of the clear, white, and orange regions of the Gatorade Label, estimated that silver ink covers approximately 52-68% of the label area, and computed an area-weighted average purporting to show whole-label blocking of approximately 57-65%. POR, 18-19; EX2012, ¶¶ 75-80. As an initial matter, this area-weighted averaging methodology appears nowhere in the '422 Patent—it is not recited in the claims, it is not described in the specification, and it is not how any Example of the '422 Patent evaluates light blocking.

Moreover, Dr. Reitman's underlying measurements do not contradict mine. Dr. Reitman does not dispute that the regions of the Gatorade Label containing the light blocking layer block at least 80% (indeed, approximately 85% or more) of incident light across the measured range. *See* EX2012, ¶¶ 79 and Figure C29; POR, 18 (acknowledging "the silver portions of the label ... block approximately 85% of light near 900nm"). The parties' measurements of the light-blocking regions are thus consistent; the disagreement concerns only Patent Owner's area-weighting construction, which, for the reasons given above, is contrary to the claim language and the specification of the '422 Patent.

34. Accordingly, it remains my opinion that the Gatorade Label satisfies the limitation "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."

[Claim 1] ...wherein the light blocking component comprises a particulate having a particle size of 0.1µm to 100µm....:

35. In my First Declaration, I opined that the Gatorade Label satisfied the limitation requiring that "the light blocking component comprises a particulate having a particle size of 0.1 µm to 100 µm." EX1014, ¶ 70. Patent Owner contends that my analysis is deficient because I did not calculate an average particle size diameter using laser diffraction and did not identify measurements corresponding to individual particles depicted in Figure 5. *See* POR, 21-22.

36. In response, I disagree. Claim 1 requires only that the light blocking component comprise "a particulate having a particle size of 0.1 μm to 100 μm ." The claim does not require that particle size be determined using laser diffraction, does not require calculation of an average particle size diameter, and does not prescribe any particular methodology for evaluating whether the recited particle size limitation is satisfied. In my First Declaration, I identified the light blocking component as aluminum particulate within the silver ink layer of the Gatorade Label. *See* EX1014, ¶¶ 65-70. Figures 5 and 6 depict the aluminum particulate within the silver ink layer in cross-section.

37. Patent Owner's criticism appears to assume that the '422 Patent's reference to laser diffraction establishes an exclusive methodology for determining particle size. I disagree. Although the specification states that "[t]he particle size referred to here is an average particle size diameter measured by laser diffraction" (EX1001, 14:8-10), laser diffraction is a technique performed on pigment particles dispersed in a fluid suspension – typically by an ink or pigment manufacturer characterizing pigment powder before it is formulated into ink. A POSITA seeking to evaluate the particle size of pigment within the cured, printed light blocking layer of a finished commercial shrink label cannot apply laser diffraction to the label as it exists; the pigment would first have to be extracted from the cured ink matrix and re-dispersed, and neither the claims nor the

specification describe how aluminum particulate would be extracted or isolated from the cured light blocking layer of a finished shrink label so that such testing could be performed. A POSITA would instead understand cross-sectional SEM imaging – the method I employed – to be a standard and reliable means of observing and measuring pigment particles in situ within a printed layer, and would understand SEM-measured particle dimensions to be informative of the particle size of the pigment as supplied. A POSITA therefore would not understand the '422 Patent's reference to laser diffraction as imposing an absolute requirement that the recited particle-size limitation be proven exclusively through that methodology, particularly with respect to a finished commercial shrink label.

38. Moreover, a POSITA understands according to the industry's own convention that aluminum pigments, including those that "resemble a leaf or a flake," are referred to as particles. EX1050, 3 ("[t]he particle shapes vary from irregular flakes (cornflakes) with ragged edges to almost completely round, yet thicker, particles with smooth rounded edges (pancakes or silver dollars)."). Thus, the flake is the particle and I measured the flake to determine its particle size.

39. With respect to the thickness dimension, Figure 5d identifies dimension D4, measuring approximately 0.66 μm across aluminum particulate observed in cross-section. Patent Owner suggests that this measurement may represent multiple aluminum flakes stacked together rather than a single flake. *See*

POR, 21. That suggestion is speculative. The cross-sectional image in Figure 5d does not show visible boundaries or delineations indicating that D4 comprises multiple stacked flakes, and the measured feature are consistent with a single aluminum flake. In addition, Patent Owner's suggestion is immaterial to the claimed upper limit: whether D4 reflects one flake or several, the measured dimension is roughly two orders of magnitude below the 100 μm ceiling recited in claim 1. Satisfying the claimed lower limit of 0.1 μm is established not by flake thickness but by the flakes' lateral dimension, which the scale demonstrates.

40. In response to Patent Owner's criticism that my First Declaration did not report an average of multiple particle measurements, because, according to Patent Owner, the specification provides that "particle size" refers to an "average particle size diameter," I note that "average particle size diameter" does not appear in the claim language. POR, 21; EX1001, 14:8-10. As set forth above, in accordance with the industry understanding that the flake is the particle, I have measured the particle size, being the size of the flakes, from the cross-sectional SEM images already of record, and conclude that the Gatorade Label satisfied the limitation requiring that "the light blocking component comprises a particulate having a particle size of 0.1 μm to 100 μm ." EX1014, ¶ 70.

41. My opinion is further supported by industry literature concerning aluminum printing inks that a POSITA performing pigment characterization

would consult. For example, Schlenk's *World of Metallics: Pigments for Printing Inks* explains that "[f]or the technology of flexo & gravure printing, medium to fine metallic pigments are recommended," and reports typical particle sizes of 6-18 μm for cornflake aluminum pigments and 10-17 μm for silver dollar aluminum pigments. EX1051, 10. Those particle sizes are substantially greater than the lower limit of 0.1 μm and comfortably within the claimed range of 0.1 μm to 100 μm . Those published values are also consistent with my own SEM-based measurements reported in my First Declaration. See EX1014, ¶ 70 and Figs. 5-6.

42. Accordingly, in view of the aluminum particulate identified in the silver ink layer of the Gatorade Label, the dimensions of the aluminum particles demonstrated in Figures 5 and 6, and a POSITA's understanding that aluminum flakes are considered particles, it remains my opinion that the Gatorade Label discloses "a light blocking component compris[ing] a particulate having a particle size of 0.1 μm to 100 μm ," as recited in claim 1.

[Claim 1] ...wherein the recyclable shrink label is recyclable with a PET container.:

43. In my First Declaration, I opined that the Gatorade Label satisfies the limitation "wherein the recyclable shrink label is recyclable with a PET container." See EX1014, ¶¶ 71-79. Patent Owner contends that the Gatorade Label is not recyclable because: (1) caustic wash testing performed by both parties' experts purportedly demonstrates that the label is not recyclable; and (2) my

testing results are vague, incomplete, and misleading because the clear control PET flakes did not contain inks and therefore do not demonstrate that inks were removed from the label. *See* POR, 22.

44. Before addressing Patent Owner's specific criticisms, I note the standard against which they must be measured. The '422 Patent does not require that every trace of ink be removed from every label flake for a label to be "recyclable." To the contrary, the '422 Patent states that "[a]ccording to an embodiment, the labels are free or substantially free of inks that cannot be washed off in a caustic wash," EX1001, 11:49-51, and the '422 Patent expressly defines "substantially" to mean "nearly completely," modifying the term that follows "by at least about 90%, at least about 95%, or at least about 98%." EX1001, 3:34-37. The intrinsic record thus contemplates that, at least in one embodiment, a recyclable label need not achieve complete ink removal. However, I understand that Dr. Reitman was unable or unwilling to quantify what amount of retained ink is "significant," and likewise declined to quantify what it means for a label to be "free or substantially free" of inks that cannot be washed off. EX1049, 104:14-106:9. Patent Owner's Ground 1 argument thus inappropriately treats any visible ink retention on any label flake as disqualifying, a standard found nowhere in the claims or the specification of the '422 Patent, and undefinable by Patent Owner's experts.

*i. Caustic Wash Testing by Both Parties' Experts Is
Consistent with the Gatorade Label Being Recyclable*

45. Patent Owner contends that caustic wash testing performed by both parties' experts purportedly demonstrates that the Gatorade Label is not recyclable. In response, I disagree. I understand from Mr. Bushman's declaration that the Gatorade Label is an SKC Ecolabel™ sleeve label; that the APR (Association of Plastic Recyclers) has recognized that label system as meeting or exceeding APR's Critical Guidance Protocol for Clear PET Articles with Labels and Closures requirements; and that the Watson Standard silver ink used in connection with the Gatorade Label passes recyclability/bleed testing under the APR protocol. EX1013, ¶¶ 47-48; EX1016; EX1018; EX1019. Accordingly, before I conducted any testing, the available evidence already indicated that the Gatorade Label system had been recognized as recyclable.

46. My testing was therefore not intended to establish recyclability in the first instance, as Patent Owner suggests. *See* POR, 23. Rather, my testing was performed to confirm that the Gatorade Label behaved consistently with what would be expected of an APR-recognized recyclable label system. Specifically, my testing evaluated whether the inks separated from the PET film during caustic wash processing and whether PET flake contamination or staining remained thereafter. In my opinion, the results confirmed those expectations: ink separated

from the PET film during the caustic wash cycle, and the PET container flakes exhibited no visible contamination or staining following processing.

47. I further note that Dr. Reitman agreed that a POSITA would consider APR guidance documents in determining whether a label is recyclable as that term is used in the claims of the '422 Patent (Q: "when evaluating whether a label is recyclable, as that term is used in the '422 Patent, a person of skill in the art would consider each of those APR documents. Correct?" A: "the body of information connected to those documents would be considered."). EX1049, 57:21-58:10. Thus, Dr. Reitman's testimony is consistent with my understanding that APR recognition is relevant to the recyclability inquiry.

48. Patent Owner criticizes my discussion of the clear PET control flakes by suggesting that I improperly implied that the control flakes demonstrated that inks had been entirely washed off the label. *See* POR, 23-24. That was not my intent, and it is not what my First Declaration says. The PET control flakes were included as a comparator for evaluating whether PET container flake contamination or staining was present following the caustic wash cycle. *See* EX1014, ¶ 77. That is the standard role of control flake in caustic wash testing. The question the control flake addresses is not whether ink left the label, but whether ink that left the label stained or contaminated the clear PET—the precise harm that, under Patent Owner's own proposed construction and the Board's

preliminary construction, distinguishes a recyclable label from a non-recyclable one. Paper 14, 11. The fact that the control flakes themselves did not originally contain ink does not diminish their utility for that purpose; it is the reason they serve that purpose.

49. Moreover, my observations were not limited to the PET control flakes. Figures 11a-11d of my First Declaration demonstrate that ink was being removed from the label flakes during the caustic wash cycle. *See* EX1014, ¶ 77; Figs. 11a-11d. Consistent with those observations, Dr. Reitman likewise acknowledged that inks were removed during the wash process (Q: "some inks have been removed. Correct?" A: "Based on the observed wash waters there is some amount of ink that has been removed..."). EX1049, 32:21-33:1. Thus, contrary to Patent Owner's suggestion, the fact that ink removal occurred during the caustic wash process is not disputed.

50. I further note that the label pieces that I selected for testing intentionally included portions of the Gatorade Label containing ink, whereas the PET container flakes did not originally contain ink. The ink-bearing label pieces permitted observation of whether ink separated from the label during processing, while the PET container flakes permitted observation of whether the PET became visibly stained or contaminated following processing. Patent Owner's criticism appears to conflate these separate functions of the test materials.

51. Figures 11a-11d further show that the PET container flakes recovered following processing do not exhibit visible discoloration or staining when compared to the control PET flakes. *See* EX1014, ¶ 77. Patent Owner itself relies on the appearance of the PET flakes in criticizing my testing and acknowledges the presence of the "clear PET control pieces" depicted in those figures. *See* POR, 23. These observations are consistent with my conclusion that the inks were being removed from the label during the wash process and were not visibly staining the PET container flakes used in my testing.

52. Patent Owner criticizes my testing results under Patent Owner's proposed construction, asserting that "a label is not recyclable ... if ... the label contains inks or pigments that could not be removed during recycling" and thus "would contaminate the PET polymer flake." POR, 24. However, the observations reflected in Figures 11a-11d of my First Declaration demonstrate that ink removal occurred during the wash process and do not demonstrate contamination or visible staining of the PET container flakes. *See* EX1014, ¶ 77. Indeed, both my testing and Dr. Reitman's testing confirm that ink removal occurred during the wash process and that there was no contamination or visible staining of the PET container flakes, as shown in the side-by-side comparison below.

Dr. Deible's Post-Wash Results	Dr. Reitman's Post-Wash Results
 <p data-bbox="315 947 591 982">EX1014, Fig. 11d.</p>	 <p data-bbox="951 829 1208 865">EX2012, Fig. 3b.</p>

53. I have also considered the position, advanced at my deposition and repeated in the POR, that I offered no opinion on whether retained ink would contaminate the PET polymer flake. EX2011, 254:23-255:1; POR, 27-28. To be clear, contamination of the PET flake is precisely what my testing was designed to observe, and what it did not find. The deposition question asked whether I had an opinion on "what amount of ink or pigment would contaminate the PET polymer flake" – i.e., a numerical threshold in the abstract. My observations here are empirical; following the caustic wash, warm water wash, float test, sieving, and drying, the PET container flakes in my testing exhibited no visible discoloration, staining, or adhered ink. *See* EX1014, ¶ 77, Figs. 11-12. Dr. Reitman's

photographs of her own post-wash container flake are consistent with that observation. EX2012, Fig. 3b

54. Patent Owner further criticizes my testing as inadequately documented and suggests that my reported observations should therefore be discounted. *See* POR, 24-25. I disagree. My First Declaration disclosed the testing that I performed, the observations obtained from that testing, and the resulting conclusions. *See* EX1014, ¶¶ 71-78.

55. Moreover, the level of detail Patent Owner now contends was required was not consistently reflected in Dr. Reitman's own testing. For example, Dr. Reitman criticized my testing while not reporting certain details of her own procedures, including that Dr. Reitman's testing did not employ an appropriately sized and shaped impeller, resulting in a different degree of agitation than the procedure she now invokes as a basis for criticizing my findings. *See* EX2012, Appendix D. Dr. Reitman used a "1-inch, oval" stir bar as opposed to a "50 mm (~2 in) in diameter" impeller called for in EX1012. EX2012, Appendix D. Agitation is a meaningful wash-test parameter. The caustic wash depends on mechanical action as well as chemistry to liberate inks from flake, and reduced agitation would be expected to reduce the extent of ink removal observed. Dr. Reitman's report further documents a wash temperature of approximately 65°C, but fails to document whether the wash water was heated to 85°C as required,

including as set forth in Dr. Reitman's own Testing Protocol (EX2012, Appendix D). *See* EX2012, Fig. C14. Wash temperature is likewise a meaningful parameter. The caustic wash specified in EX1012 and the APR protocols is conducted at elevated temperature precisely because ink release is temperature-dependent, and a wash conducted approximately 20°C below the specified temperature would be expected to remove less ink. In other words, the two undocumented or non-conforming parameters in Dr. Reitman's own procedure are parameters that each bias her test toward greater ink retention – the very observation she relies upon. In addition, while Patent Owner faults my testing methodology, Dr. Reitman did not utilize a Shimadzu UV-2600i spectrophotometer, despite Patent Owner's repeated reliance elsewhere on the '422 Patent's discussion of using the Shimadzu instrument for testing (Q: "Yes or no, Dr. Reitman, did you use a Shimadzu model UV-2600i as part of your testing in paragraph 79?" A: "No, I did not use that brand of system."). EX1049, 96:22-97:3.

56. I also note that, unlike my First Declaration, Dr. Reitman's report did not include photographs of the wash waters following caustic wash processing or photographs of the warm water wash following sieving analogous to those provided in Figure 12 of my First Declaration. Figure 12 was included in my First Declaration to show the appearance of the wash solutions, including the separation of ink from the label pieces. This is an important observation in accordance with

at least EX1012 ("If the ink separates from the label film in the wash step, it is desirable that the ink be readily filtered from the PET flake as well as the wash water.").

57. In my opinion, the absence of photographs of the wash waters and the post-sieving warm water wash in Dr. Reitman's report makes it more difficult to assess and compare the observations underlying Dr. Reitman's conclusions regarding the caustic wash process. Given Patent Owner's criticism of the level of detail provided in my testing, I find it notable that Dr. Reitman did not document the appearance of her wash waters or the post-sieving warm water wash.

58. I further note the POR describes the APR's plaque inspection protocol (PET-S-09) as providing "an objective standard for determining whether the inks have sufficiently washed off to reclaim the underlying resin," POR, 89, 91-93, and describes the plaque color, haze, and inclusion evaluation as a "[r]equired evaluation[]" under the APR Critical Guidance flow chart. POR, 91. Yet, as far as I can determine from EX2012 and EX2013, neither Dr. Reitman nor Dr. Phillips performed any plaque evaluation, any wash-water evaluation, or any other quantitative assessment of contamination on the Gatorade Label flake before concluding the Gatorade Label was not recyclable. Their opinions that retained ink "would contaminate the recycling stream" rest on visual inspection of flake photographs – the very kind of qualitative observation Patent Owner criticizes in

my testing – rather than on the objective metric that Patent Owner itself identifies as the standard. By Patent Owner's own framework, the record contains no plaque, color, haze, or inclusion data showing that the Gatorade Label is not recyclable.

59. Further, I understand Patent Owner takes the position that because my testing purportedly shows only that the label ink was partially removed, it therefore confirms that the Gatorade Label is not recyclable. POR, 26-28. I disagree with Patent Owner's characterization of my testing. As discussed above, my testing was directed to observing whether ink removal occurred during processing, and in particular the caustic wash cycle, and whether the PET container flakes exhibited visible contamination or staining following processing. My testing showed that ink was removed during the wash process and that the PET container flakes did not exhibit visible contamination or staining. *See* EX1014, ¶ 77 and Figs. 11a-11d.

60. Relatedly, Patent Owner characterizes my deposition testimony regarding "process optimization" as a "Hail-Mary." POR, 29. That characterization misunderstands the testimony. My point at deposition was a routine one familiar to anyone who conducts wash testing: the extent of ink removal observed in any single laboratory wash varies with standard process parameters – time, temperature, caustic concentration, and agitation – each of which would apply during commercial reclaiming operations as well. Observing

residual ink on some label flakes after one laboratory wash cycle conducted at fixed parameters does not establish that the inks "could not be removed during recycling" (Paper 14, 11); it reflects the ordinary parameter-dependence of the wash step. Indeed, Dr. Reitman's own wash – conducted with a smaller stirrer and at a lower temperature than specified (*see supra* ¶ 55) – is illustrative of this.

61. Moreover, Patent Owner itself relies on the PFE report designated as EX2038 to demonstrate that partial removal of ink allegedly means non-recyclable, yet that report likewise does not conclude that partial ink retention alone renders the tested label non-recyclable. Rather, EX2038 expressly concludes that the tested article "[d]oes not meet all APR guidelines for PET" and identifies numerous observations contributing to that conclusion, including that discoloration was observed in the wash water, that plaque color requirements were not met, and that residual ink appeared to carry forward into plaque production. EX2038, 5. The report identifies ten separate observations underlying its conclusions and does not state that partial ink retention, standing alone, determines recyclability. Indeed, EX2038 separately notes that "[w]ash water was able to be filtered" and that "[n]o floatables were observed during the wash processing." EX2038, 5. Thus, even the report relied upon by Patent Owner and Patent Owner's experts recognizes that recyclability involves consideration of

multiple factors rather than any single observation, such as ink retention, in isolation.

62. On this point, according to Dr. Phillips, “if the inks completely wash off the film, and those inks do not contaminate or discolor PET flake during a hot caustic wash,” that is not sufficient for a label to meet the requirement “wherein the recyclable shrink label is recyclable with a PET container.” EX1048, 80:17-82:13. All of the other APR tests he identified would also have to be considered. *Id.* The tests that would also have to be considered, according to Dr. Phillips, include PET-CG-02, PET-B-02, RES-LBL-2, “a NIR IR test for separation,” “other separation tests, magnetic separation tests,” “tests associated with the shredding process,” “caustic wash and tests associated with the material that comes from the caustic wash,” tests associated with “the extrusion process,” tests “on the pellets” that are made from the extrusion process, and tests on samples of “plaques” resulting from an injection molding process. EX1048, 17:17-20:5.

63. Notably, the determinative observations in EX2038 – wash-water discoloration and failed plaque color requirements, among others – are quantitative contamination findings of exactly the kind absent from Dr. Reitman's and Dr. Phillips's analysis of the Gatorade Label. *See supra* ¶ 58. The PFE-tested label failed because contamination was measured; for the Gatorade Label, no such

measurement was performed by Patent Owner's experts, and my own observations showed no visible contamination of the PET flake.

64. Accordingly, I disagree with Patent Owner's attempt to characterize my testing as establishing non-recyclability merely because some ink is retained on the label. My testing demonstrated that ink removal occurred during the caustic wash cycle and that the PET container flakes did not exhibit visible contamination or staining, and therefore supports and confirms my analysis and my conclusions.

*ii. Patent Owner's Criticisms Do Not Undermine the
Credibility of Testing Conducted Consistent with the '422
Patent*

65. Patent Owner asserts that my testing was based on "flawed methodology." POR, 30. In response, I disagree. My First Declaration explained that laboratory testing was conducted with reference to the disclosures of the '422 Patent (EX1001, 6:61-64; 11:29-53) and RD-TM-210-4 (EX1012).

66. Moreover, notwithstanding Patent Owner's criticism, Dr. Reitman was able to replicate the caustic wash procedure based on the information disclosed in my First Declaration and expressly acknowledged that my testing "appears to generally follow the MCC document." EX2012, ¶ 60. In my opinion, the fact that Dr. Reitman was able to perform her own testing using the procedure set forth in my First Declaration demonstrates that the methodology disclosed in

my First Declaration was sufficiently clear and repeatable to permit evaluation and replication by another expert.

67. Patent Owner further argues that I attempted to mislead the Board by suggesting that the clear flakes depicted in Figures 11a-11d demonstrate that label pieces became completely free of ink during processing. POR, 30-31. As an initial matter, as discussed above, my testing was directed to observing whether ink removal occurred during processing and whether the PET container flakes exhibited visible contamination or staining following processing. Consistent with those objectives, and contrary to Patent Owner's assertions, my observations demonstrated that ink was removed during the wash process and that the PET container flakes did not exhibit visible contamination or staining. *See* EX1014, ¶¶ 77 and Figs. 11-12.

68. Neither my First Declaration nor the Petition represented that Figures 11-12 demonstrated that individual label pieces had become entirely free of ink. Rather, my First Declaration described the observations reflected in those figures: that ink was removed during the wash process and that the PET container flakes did not exhibit visible contamination or staining following processing. *See* EX1014, ¶¶ 77-78 and Figs. 11-12. Indeed, Figures 11a-11d are accurately described as photographs taken after the caustic wash, warm water wash, float

test, and drying, and, in the case of Figure 12, after sieving. *See* EX1014, Figs. 11-12.

69. Patent Owner's criticism instead arises from a line of questioning first posed during my deposition. POR, 30-31. Patent Owner then points to Dr. Reitman's use of before-and-after photographs of label pieces as evidence that such testing could have been performed and presented so as not to be misleading. *See id.* (citing EX2012, Fig. C11). The fact that testing results may be presented differently, however, does not render misleading the observations and photographs actually disclosed in my First Declaration. My First Declaration accurately described the testing that was performed, the resulting observations, and the limitations of those observations.

70. Accordingly, I disagree with Patent Owner's assertion that my testing or testimony was misleading. The photographs in Figures 11-12 depict precisely what they were described as depicting, and my deposition testimony did not alter or expand upon the opinions expressed in my First Declaration.

71. Patent Owner further criticizes my testing by asserting that I "never identif[y] which portions of the Gatorade label [were] used to prepare the samples tested" and notes that the Gatorade Label contains multiple regions having different appearances and ink compositions. POR, 32. In response, I disagree.

72. My First Declaration identified the portions of the Gatorade Label relevant to the claim limitations being evaluated. For example, my First Declaration explained that the silver portions of the Gatorade Label contained the aluminum light blocking layer and formed the basis for my analyses relating to the light blocking layer, light blocking component, and associated testing. *See* EX1014, ¶ 79. In addition, the post-wash photographs themselves answer Patent Owner's speculation that my wash samples "could have" contained no silver ink (POR, 35; EX2011, 197:13-21): Figures 11a-11d depict label pieces bearing visible silver and black printing following the wash procedures. The tested samples therefore demonstrably included silver-ink-bearing portions of the Gatorade Label – the portions containing the light blocking layer at issue.

73. Patent Owner criticizes the quantities of label and PET control flake used in my testing, being 0.15 g of preshrunk label flake combined with 5 g of PET control flake, by comparing them to the ratios identified in APR and MCC guidance documents. POR, 36-37. I have considered a portion of Dr. Bushman's declaration (EX1047) on this issue, specifically ¶ 87. I understand from Dr. Bushman's perspective, including based on his significant APR testing experience, that my testing in this regard is appropriate. EX1047, ¶ 87.

74. Patent Owner further criticizes my testing because I preshrunk portions of the Gatorade Label using a hot air gun around a one-inch PVC pipe,

rather than shrinking the label around the intended container using a water bath.

POR, 37-38. In response, I disagree.

75. My First Declaration disclosed that the Gatorade Label samples used in the caustic wash testing were preshrunk prior to processing. *See* EX1014, ¶ 72 and Fig. 8. The purpose of that preshrinking step was to evaluate Gatorade Label material representative of a shrink sleeve after application to a container and shrinkage, rather than to characterize shrink performance or determine the extent of shrinkage achieved by the Gatorade Label.

76. Moreover, neither the claims of the '422 Patent nor the portions of the specification relied upon by Patent Owner prescribe a mandatory methodology for preshrinking labels prior to caustic wash evaluation. The '422 Patent states that shrinkage of heat shrink films is "typically measured using a hot water bath method," and explains that such measurements are used to generate shrink values and shrink curves. EX1001, 8:19-24. The '422 Patent does not state that hot water bath shrinking is the exclusive means by which a label may be shrunk prior to subsequent testing, nor does it require that a label be preshrunk on its intended container before evaluating other characteristics.

77. The '422 Patent further recognizes that substantial shrinkage of shrink sleeve labels is expected. For example, the '422 Patent explains that the heat shrink film may shrink by "90% or less" relative to its original size. EX1001,

8:29-31. Thus, the occurrence of significant shrinkage or deformation following application of heat is not unexpected and, by itself, does not establish that the preshrunk samples were unsuitable for the observations reported in my First Declaration.

78. I further note that Dr. Reitman employed the same preshrinking approach she and Patent Owner criticize. Indeed, the POR acknowledges that Dr. Reitman "performed a similar pre-shrinking of the Gatorade label using a 1-inch pipe." POR, 38; EX2012, ¶ 64, Fig. C1e. If preshrinking around a one-inch pipe introduced the wrinkling-induced bias Patent Owner posits, that bias would equally infect Dr. Reitman's testing. Yet, Patent Owner relies on Dr. Reitman's results without qualification. Patent Owner cannot have it both ways.

79. Nor do my observations support Dr. Phillips's hypothesis that ink removal in my testing was attributable to mechanical delamination caused by over-shrinking rather than to the caustic wash. EX2013, ¶¶ 108-10. Delamination of a cured ink film from a substrate produces intact ink films or fragments that would be observed as discrete ink flakes in the wash vessel, on the sieve, or in the wash water. Further, Figures 18–19 of my First Declaration depict labels that were shrunk in a water bath without being applied to a substrate. As a result, those labels were permitted to shrink to their maximum extent, representing a more severe shrinking condition than would be expected during normal application to a

substrate, such as a container. Even under those conditions, the ink layers remained intact and exhibited no delamination. EX1014, Appendix B, Figs. 18–19.

80. Finally, with respect to Patent Owner's observation that certain figures of my First Declaration relating to the wash testing depict the Febreze label (POR, 27 n.2, identifying Figures 8, 9, 10, and 11a), the Gatorade-specific observations supporting my opinions under Ground 1 are reflected in Figures 11b–11d, which depict Gatorade Label flake and PET container flake following the wash procedures, and in Figure 11.

2. Claim 2

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

81. As established in my First Declaration, each Gatorade Label contains indicia. *See* EX1014, ¶ 80 and Fig. 1. Patent Owner contends that Petitioner has failed to establish the presence of an "indicia layer" as recited in claim 2. POR, 44–45. In response, I disagree.

82. Patent Owner argues that Petitioner has failed to show that the Gatorade Label consists of discrete ink "layers" and suggests that the observed ink trapping is instead consistent with a printing process in which different ink combinations are deposited in adjacent regions of the label rather than in stacked layers. POR, 44–45. However, claim 2 merely recites that the recyclable shrink

label "further compris[es] an indicia layer." EX1001, cl. 2. A POSITA would understand that the claim requires the presence of an indicia layer. It does not require that the indicia layer be formed by stacked inks, comprise discrete ink layers deposited on top of one another, or otherwise include the additional limitations that Patent Owner seeks to import into the claim.

83. The '422 Patent confirms the breadth of the term "indicia layer." The patent explains that "[d]isclosed labels may also include an indicia layer applied thereon or on a layer applied onto the shrink film," and that "[t]he indicia layer can be applied by applying one or more layers or one or more partial layers of an image-forming composition." EX1001, 15:54-59. The '422 Patent further describes that "[v]irtually any ink or combination of ink compositions that are useful in forming indicia (e.g., an image and associated text for forming a product label) can be utilized in forming an indicia layer as disclosed herein." *Id.* at 15:64-67. Importantly, the '422 Patent expressly states that "[t]he indicia layer need not be constant, continuous, or complete across the entirety of the shrink film." *Id.* at 16:47-48. The '422 Patent additionally explains that "[t]he indicia layer may be an ink or graphics layer," may be "a mono-colored or multi-colored print layer," and may include "variable imprinted data such as serial numbers, bar codes, trademarks, etc." *Id.* at 16:49-53. Thus, the '422 Patent makes clear that the term "indicia layer" broadly encompasses printed graphics and text formed from one or

more inks and does not require the particular layered printing arrangement urged by Patent Owner.

84. As shown in Figure 1 of my First Declaration, the Gatorade Label plainly contains printed indicia, including graphics, text, and trademarks. *See* EX1014, ¶ 80 and Fig. 1. Under the ordinary meaning of the claim language and consistent with the disclosures of the '422 Patent, those printed indicia constitute an indicia layer. To the extent Patent Owner argues otherwise, such arguments improperly import limitations from selected embodiments into the claims.

85. Accordingly, it remains my opinion that the Gatorade Label contains "an indicia layer," as recited in claim 2. Given the presence of the printed indicia shown in Figure 1 and the broad manner in which the '422 Patent describes an indicia layer, a POSITA would have readily understood and at once envisaged that the Gatorade Label includes the claimed indicia layer.

3. Claim 3

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

86. In my First Declaration, I opined that the Gatorade Label satisfies claim 3 because the labels "all contain a high opacity layer comprised of rutile titanium dioxide," as established through SEM-EDS and Raman spectroscopy. EX1014, ¶ 81; Figs. 6 and 13. Patent Owner contends that this analysis is deficient

for two reasons. First, that Petitioner has not shown the Gatorade Label contains distinct "layers" at all (POR, 45, incorporating POR § V.A.3), and second, that Figures 6 and 14 do not establish the presence of a "white pigment" in a high opacity layer because Figure 6 "does not show or provide any explanation that the high opacity layer incorporates a white pigment," and because paragraph 81 of my First Declaration "does not make any reference to the required 'white pigment.'" POR, 45-46; EX2013, ¶¶ 129-140. In response, I disagree with both criticisms.

87. First, with respect to the existence of distinct layers, the cross-sectional SEM-EDS analyses in my First Declaration directly demonstrate a layered structure. As shown in Figures 6a-6d, EDS spectra collected at different depths at the same lateral position of the cross-sectioned label reveal compositionally distinct strata. The spectra collected at the locations marked with green circles show titanium and oxygen peaks consistent with titanium dioxide, while the spectra collected at the locations marked with red circles show a dominant aluminum peak consistent with metallic aluminum flake. EX1014, Appendix B, Figs. 6a-6d. Two vertically stacked regions of different chemical composition at the same lateral position are, by definition, distinct layers – one a titanium dioxide (high opacity) layer and the other an aluminum (light blocking) layer. Dr. Phillips's contrary suggestion that the Gatorade Label reflects only "different ink combinations ... deposited in adjacent regions" (EX2013, ¶¶ 131-35)

addresses the lateral arrangement of differently colored regions across the face of the label; it does not engage, and cannot be reconciled with, the cross-sectional evidence showing chemically distinct printed strata stacked through the thickness of the label.

88. Second, with respect to "white pigment," rutile titanium dioxide *is* a white pigment. The '422 Patent says so expressly. In describing the high opacity layer, the '422 Patent states, "[e]xamples of useful white pigments include, for example, titanium dioxide (TiO₂), precipitated calcium carbonate (PCC), aluminum silicate, aluminum oxide (i.e., alumina), mica-based pigments coated with thin layer(s) of white pigment (such as TiO₂), and combinations thereof." EX1001, 12:1-5. Titanium dioxide is the first-listed example of a "white pigment" in the '422 Patent, and claim 10 of the '422 Patent likewise recites "titanium dioxide (TiO₂)" as the first-listed pigment of the high opacity layer. EX1001, cl. 10. A POSITA would understand that identifying rutile titanium dioxide in a printed layer is identifying a white pigment.

89. Patent Owner's criticism that paragraph 81 of my First Declaration "does not make any reference to the required 'white pigment'" (POR, 46) is therefore a criticism of vocabulary, not of substance. My First Declaration identified the composition of the high opacity layer as rutile titanium dioxide using two independent analytical techniques: SEM-EDS (Figure 6) and Raman

spectroscopy (Figure 13). EX1014, ¶ 81. To the extent it is helpful to the Board, I state it expressly here: the rutile titanium dioxide identified in the high opacity layer of the Gatorade Label in Figures 6 and 13 of my First Declaration is a white pigment, as the '422 Patent itself confirms.

90. Patent Owner also asserts that "[a]lthough Figure 14 appears to show white ink, Petitioner provides no analysis that the white pigment is part of a high opacity layer." POR, 46. Patent Owner thus concedes that Figure 14 shows white ink on the Gatorade Label. The optical observation of white ink in Figure 14 corroborates, and is fully consistent with, the analytical identification of the TiO₂-containing stratum in the SEM-EDS and Raman data.

91. As to whether the titanium dioxide layer is a "high opacity" layer: the '422 Patent defines "high opacity" as referring to "a substrate or printed substrate having opacity greater than or equal to 50%," with opacity measuring "the capacity of the substrate to hide or obscure from view an object placed behind the substrate." EX1001, 5:4-24. A POSITA would understand that the function of a TiO₂-pigmented white layer in a label construction of this kind is exactly that hiding function, and the '422 Patent explains that the high opacity layer "provide[s] a white opaque background for the label's artwork or graphics provided in the indicia layer." EX1001, 19:15-20. That is the role the TiO₂ layer serves in the Gatorade Label, providing the white background against which the

label graphics appear, as can be seen in at least Figure 1 of my First Declaration. EX1014, Figure 1.

92. Finally, Patent Owner's incorporation of its "layers versus regions" argument (POR, 45, citing POR § V.A.3) fails for claim 3 for the same reasons set forth in, e.g., ¶ 82 above. The SEM-EDS cross-sections show a discrete titanium-dioxide-rich stratum that is vertically distinct from the aluminum-rich stratum and from the PET film. That is a "high opacity layer" within the meaning of the claims, which, like the light blocking layer and the indicia layer, "need not be constant, continuous, or complete across the entirety of the shrink film." EX1001, 13:8-12.

93. Accordingly, it remains my opinion that the Gatorade Label includes "a high opacity layer comprising a white pigment," as recited in claim 3.

4. Claim 5

[Claim 5] wherein the heat shrink film consists of polyethylene terephthalate (PET)

94. In my First Declaration, I opined that the heat shrink film of the Gatorade Label is polyethylene terephthalate (PET), as confirmed by FTIR analysis showing that the film spectra match both an internal PET reference standard measured on the same instrument and a PET reference spectrum from the Wiley KnowItAll library. EX1014, ¶¶ 60-61, 82; Figs. 2-3. Patent Owner states

that claim 5 requires the heat shrink film to "consist[] of" PET, that the Petition and my First Declaration misquoted this limitation as "is comprised of," and that neither performed "any analysis or reach[ed] any conclusion that PET is the only compound present in the shrink film, to the exclusion of other compounds." POR, 46-47; EX2013, ¶ 139. In response, I disagree. Although paragraph 82 of my First Declaration quoted the claim language incorrectly, my analysis was not directed to the quoted words – it was directed to determining the composition of the heat shrink film itself, and that analysis supports the conclusion that the film consists of PET.

95. The FTIR samples were sectioned such that the measured spectra reflect the composition of the film itself. EX1014, ¶ 60. The spectra of the Gatorade samples (3191157, 3191167, and 3191176) match the PET reference spectra across the measured range, and they contain no additional or unexplained absorption bands attributable to any other polymer. EX1014, Fig. 2. Had the film contained any of the alternative shrink-film polymers identified in the '422 Patent – e.g., PVC, polystyrene, PLA, polypropylene, or polyethylene (EX1001, col. 1, ll. 52-65.) – that polymer would have produced its own characteristic absorption bands in the measured spectra. No such bands are present. The FTIR data thus show that PET, and no other polymer, is present in the heat shrink film.

96. Accordingly, it remains my opinion that the heat shrink film of the Gatorade Label consists of polyethylene terephthalate (PET), as recited in claim 5.

5. Claim 6

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

97. In my First Declaration, I opined that the Gatorade Label is in the form of a sleeve or tube, as recited in claim 6. *See* EX1014, ¶ 83. I understand that Patent Owner does not separately dispute my findings as to claim 6, and it remains my opinion that the Gatorade Label meets the limitations of claim 6.

6. Claim 7

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

98. In my First Declaration, I opined that the Gatorade Label comprises a seam, as recited in claim 7. *See* EX1014, ¶ 84. I understand that Patent Owner does not separately dispute my findings as to claim 7, and it remains my opinion that the Gatorade Label meets the limitations of claim 7.

7. Claim 8

[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%.

99. In my First Declaration, I opined that the Gatorade Label shrunk perpendicular to the seam by approximately 70-80%. *See* EX1014, ¶ 85-88. I understand that Patent Owner does not separately dispute my findings as to claim 8, and it remains my opinion that the Gatorade Label meets the limitations of claim 8.

8. Claim 9

[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%.

100. In my First Declaration, I opined that the Gatorade Label, when heated to 100° C, shrinks by 70-80%. *See* EX1014, ¶ 85-89. I understand that Patent Owner does not separately dispute my findings as to claim 9, and it remains my opinion that the Gatorade Label meets the limitations of claim 9.

9. Claim 10

[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.

101. In my First Declaration, I opined that the Gatorade Label satisfies claim 10 because the labels "all have a high opacity layer that contains titanium dioxide," as established through SEM-EDS and Raman spectroscopy. EX1014, ¶

90; Figs. 6 and 13. Patent Owner contends that claim 10 is not met for the same reasons it advances against claim 3, namely, that Petitioner has not shown that the Gatorade Label contains a distinct high opacity "layer" as opposed to regions of ink, and has not shown that any such layer comprises the required pigment. POR, 45-46 (addressing claims 3 and 10 together). In response, I disagree, for the reasons set forth in my claim 3 analysis above, which I incorporate here. *See supra* ¶¶ 86-93.

102. Claim 10 differs from claim 3 only in that it recites a group of specific pigments rather than the more general "white pigment." That difference makes Patent Owner's position weaker for claim 10, not stronger. That is, whereas Patent Owner argues that claim 3 required the additional step of confirming that titanium dioxide is a "white pigment," claim 10 recites "titanium dioxide (TiO₂)" by name as the first member of the claimed pigment group. My SEM-EDS analysis identified titanium and oxygen in the high opacity layer (Figures 6a-6d, green-circle spectra), and my Raman analysis identified the rutile crystal form of titanium dioxide specifically (Figure 13). EX1014, ¶¶ 81, 90. The identified rutile titanium dioxide is the first-listed pigment of claim 10's group. No further analysis is required to map the identified composition onto the claim language.

103. Accordingly, it remains my opinion that the Gatorade Label includes a high opacity layer comprising titanium dioxide (TiO₂), as recited in claim 10.

10. Claim 11

[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.

104. In my First Declaration, I opined that the Gatorade Label satisfies claim 11 because "[t]he labels all have a light blocking component that contains aluminum," as established through SEM-EDS analysis. EX1014, ¶ 91; Fig. 6. Patent Owner contends that this limitation is not met for the reasons advanced against claim 1 and its "layers versus regions" argument set forth in POR, § V.A.3. POR, 47. In response, I disagree, for the reasons set forth in ¶ 82 above and in my claim 3 analysis (¶¶ 86-93), which I incorporate here.

105. As with claim 10, the claim language itself resolves the issue. Claim 11 recites "aluminum" by name as a member of the claimed group of light blocking components. The EDS spectra collected from the light blocking layer (Figures 6a-6d, red-circle spectra) show a dominant aluminum peak, identifying

the light blocking component as aluminum particulate. EX1014, ¶¶ 65-66, 91. The identified component is a named member of claim 11's recited group.

106. Accordingly, it remains my opinion that the Gatorade Label's light blocking component comprises aluminum, as recited in claim 11.

11. Claim 12

[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.

107. In my First Declaration, I opined that the Gatorade Label satisfies claim 12 based on Inductively Coupled Plasma (ICP) measurement of the weight percent of aluminum in a label sample and calculations converting that measurement to pounds per ream (ppr), concluding that for every sample, the light blocking layer is present in an amount of 0.5 ppr to 25 ppr relative to the recyclable shrink label. EX1014, ¶¶ 92-96. Patent Owner contends that my analysis is deficient because (1) my calculation assumed the light blocking layer covers the entire Gatorade Label, whereas Dr. Reitman estimates the silver ink covers only 52-68% of the label area; (2) my assumption that the aluminum constitutes approximately 10% of the light blocking layer was unsupported; and (3) applying Dr. Reitman's area adjustment yields approximately 0.3 ppr of

aluminum, below the claimed range. POR, 47-48. In response, I disagree, for several independent reasons that follow.

108. *First*, claim 12 is directed to the amount of the light blocking layer, not the amount of aluminum pigment alone. The light blocking layer is a printed ink layer comprising the light blocking component *and* the resin binder and other non-volatile ink constituents in which the component is dispersed. The '422 Patent describes the light blocking composition as including, "[i]n addition to the light blocking components," resins "such as nitrocellulose, polyamide, vinyl, or acrylic," and additives. EX1001, 14:16-22. The cross-sectional SEM images of Figure 6 show exactly that structure—discrete aluminum flakes embedded in a continuous binder matrix that constitutes a substantial portion of the layer. EX1014, Figs. 5-6. ICP, by contrast, measures only the aluminum. Accordingly, any ppr value computed from the ICP aluminum measurement alone is a floor for the weight of the light blocking layer; the layer's total dry weight is necessarily greater by the weight of the binder and other ink solids.

109. *Second*, my use of an approximately 10% aluminum content to convert the measured aluminum weight to the weight of the light blocking layer was not arbitrary, it was conservative, and it is grounded in the '422 Patent itself. The specification states that "[t]he amount of light blocking component in the light blocking composition may be 3.0 wt-% or greater, 5.0 wt-% or greater, or 10 wt-%

or greater," and "may be from 3.0 wt-% to 50 wt-%, 5.0 wt-% to 40 wt-%, or from 10 wt-% to 25 wt-%." EX1001, 14:23-30. Ten percent thus sits within the '422 Patent's own disclosed and indeed, preferred, range for the pigment fraction of the light blocking composition. And the SEM images of Figure 6, showing aluminum flakes dispersed within a binder matrix that makes up a substantial portion of the layer, confirm that the aluminum is a minority constituent of the layer, consistent with a pigment fraction in the disclosed range. Further, because the tested portion entirely contained aluminum, the mass of aluminum can be normalized to any printed area; the small area tested, half of a label, or an entire ream.

110. *Third*, even adopting Patent Owner's own numbers, the claim limitation is satisfied. Dr. Reitman's area-adjusted calculation yields approximately 0.3 ppr of *aluminum*. EX2012, ¶ 145. Converting that aluminum-only figure to the weight of the light blocking layer using any pigment fraction within the range disclosed in the '422 Patent yields a layer amount within the claimed range. At the '422 Patent's maximum disclosed pigment loading of 50 wt-%, 0.3 ppr of aluminum corresponds to a layer of 0.6 ppr; at the preferred 10-25 wt-% loadings, the layer is 1.2 to 3.0 ppr. Each value falls within "0.5 ppr to 25 ppr." In other words, Dr. Reitman's 0.3 ppr figure falls below the claimed range only because she compares an aluminum-only weight against a limitation directed to the entire layer.

111. *Fourth*, the premise of Dr. Reitman's area adjustment, that the ppr of the light blocking layer must be discounted by the fraction of label area the layer does not cover, is contrary to the '422 Patent. The specification of the '422 Patent expressly provides that "[t]he light blocking layer need not be constant, continuous or complete across the entirety of the shrink film." EX1001, 15:45-47. A POSITA would accordingly understand the ppr of the light blocking layer to describe the coating weight of the layer where it is applied, just as the light blocking layer's light blocking performance is evaluated where the light blocking layer is present. Nothing in the claims or the specification of the '422 Patent directs that the light blocking layer's coat weight be diluted by averaging over regions of the label artwork where the layer was not printed.

112. *Fifth*, I note that the '422 Patent instructs that "[u]nless otherwise indicated, all numbers expressing quantities of components, molecular weights, and so forth used in the specification and claims are to be understood as being modified in all instances by the term 'about.' As used herein in connection with a measured quantity, the term 'about' refers to that variation in the measured quantity as would be expected by the skilled artisan making the measurement..." EX1001, 4:12-22. The claimed range is accordingly understood as "about 0.5 ppr to about 25 ppr." That understanding provides additional, independent confirmation that the Gatorade Label satisfies claim 12. Indeed, the values

calculated in my First Declaration fall within the range outright, and calculations incorporating Patent Owner's adjustments fall within the range as properly understood.

113. Accordingly, it remains my opinion that the light blocking layer of the Gatorade Label is present in an amount of 0.5 ppr to 25 ppr relative to the recyclable shrink label, as recited in claim 12.

12. Claim 13

[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.

114. In my First Declaration, I opined that the Gatorade Label satisfies claim 13 because my calculations demonstrated that the values for the Gatorade Label fell within the claimed range recited in claim 13. EX1014, ¶ 97. Patent Owner contends that this limitation fails for the same reasons it advances against claim 12. POR, 48-49. In response, I disagree.

115. Claim 13 differs from claim 12 in that claim 12 is directed to the amount of the light blocking layer, as compared to claim 13 which is directed to the amount of the light blocking component (here, the aluminum) within the light blocking layer. The ICP measurement underlying my First Declaration measures exactly that quantity, and the values calculated fall within the claimed range of 0.1 ppr to 10 ppr. EX1014, ¶¶ 93-97.

116. More importantly, Patent Owner's own numbers satisfy claim 13. Dr. Reitman's area-adjusted calculation concludes that the aluminum is present at approximately 0.3 ppr. EX2012, ¶ 84. Three-tenths of a ppr falls squarely within claim 13's recited range of "0.1 ppr to 10 ppr of the light blocking component."

117. Accordingly, it remains my opinion, as confirmed by Patent Owner's own expert's calculation, that the light blocking layer of the Gatorade Label comprises from 0.1 ppr to 10 ppr of the light blocking component, as recited in claim 13.

13. Claim 14

[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.

118. In my First Declaration, I opined that the Gatorade Label satisfies claim 14 because the bottles to which the tested labels are affixed are recyclable PET bottles and the internal surface of the label sleeve faces, and is disposed on, the container. EX1014, ¶ 98. Patent Owner contends that no evidence the Gatorade Label was used with a PET container as of the priority date of the '422 Patent was provided. In response, I disagree.

119. I understand from Mr. Bushman's declaration that the bottles to which the Gatorade Labels were affixed are recyclable PET bottles. EX1013, ¶ 53

120. As to "disposed on the container," the Gatorade Label is a seamed sleeve (EX1014, ¶ 83; Fig. 16), the internal surface of the Gatorade Label faces the container when applied, and the label is applied to and shrunk onto the bottle's external surface. EX1014, ¶ 98; EX1013, ¶ 53. Accordingly, it remains my opinion that the limitations of claim 14 are met.

14. Claim 15

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

121. In my First Declaration, I opined that the limitations of claim 15 are met because, for samples 3191157, 3191167, and 3191176, the high opacity layer and the light blocking layer faces the external surface of the container. EX1014, ¶ 99; Figs. 5-6. I specifically cited to Figures 5 and 6 as demonstrating this claim limitation. *See id.* Patent Owner contends that this analysis is conclusory, fails to identify the claimed "first surface," and cites generally to my appendix. POR, 51. In response, I disagree, for the reasons set forth in ¶¶ 13-23 above, which I incorporate here.

122. For each of Gatorade samples 3191157, 3191167, and 3191176, the first surface of the PET heat shrink film is the container-facing surface – the surface adjacent the printed stack shown in Figures 5b-5d and 6b-6d, oriented in each image toward "the surface that would contact the substrate." When the sleeve

is applied to the bottle, that first surface – together with the light blocking and high opacity layers disposed adjacent to it – faces the external surface of the container, exactly as the '422 Patent describes: "the first surface may be the side facing the container," with "the light blocking layer ... disposed between the shrink film and the container." EX1001, 6:45-50.

123. Accordingly, it remains my opinion that the first surface of the heat shrink film faces the external surface of the container, as recited in claim 15.

15. Claim 16

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

124. In my First Declaration, I opined that claim 16 is satisfied because the indicia layer is located between the PET film and the high opacity layer. EX1014, ¶ 100. Patent Owner contends that this analysis is conclusory and that no "first surface" was identified. POR, 51-52. In response, I disagree.

125. As shown in Figure 1 of my First Declaration, the Gatorade Label plainly contains printed indicia, including graphics, text, and trademarks. *See* EX1014, ¶ 80 and Fig. 1. Under the ordinary meaning of the claim language and consistent with the disclosures of the '422 Patent, those printed indicia constitute an indicia layer. Further, as discussed above, the PET film includes opposing first and second surfaces. *See supra* ¶¶ 14–23. Cross-sectional SEM images in my First

Declaration, including Figure 5c, show the printed layer stack disposed on that first surface. EX1014, Appendix B. Accordingly, the Gatorade Label satisfies claim 16.

126. Accordingly, it remains my opinion that the indicia layer of the Gatorade Label is disposed on the first surface, as recited in claim 16.

16. Claim 17

[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.

127. In my First Declaration, I opined that the Gatorade Label shrunk in the transverse direction by approximately 70-80% when heated to 100° C. See EX1014, ¶ 101. I understand that Patent Owner does not separately dispute my findings as to claim 17, and it remains my opinion that the Gatorade Label meets the limitations of claim 17.

17. Claim 18

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

128. In my First Declaration, I opined that claim 18 is satisfied because the FTIR analyses show each film is consistent with PET, and Mr. Bushman's declaration demonstrates that the PET of the label film is crystallizable. EX1014, ¶ 102. I understand that Patent Owner does not separately dispute my findings as to

claim 18, and it remains my opinion that the Gatorade Label meets the limitations of claim 18.

18. Claim 19

129. In my First Declaration, I opined that the Gatorade Label discloses each element of independent claim 19. EX1014, ¶¶ 103-106. I understand that Patent Owner disputes claim 19 by incorporating its arguments against the corresponding limitations of claims 1 and 3. POR, 52. In response, I disagree, for the reasons set forth above with respect to each corresponding limitation, which I incorporate here as set forth below.

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

130. See *supra* ¶¶ 13-23; see also EX1014, ¶ 103.

[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.

131. See *supra* ¶¶ 13-23; see also EX1014, ¶ 104.

[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...

132. See *supra* ¶¶ 24-34; see also EX1014, ¶ 105.

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

133. See *supra* ¶¶ 43-80 and 86-93; see also EX1014, ¶ 106.

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

134. In my First Declaration, I opined that claim 4 would have been obvious over the Gatorade Label in view of the knowledge of a POSITA, including Mitchell et al. (US 2017/0223879) ("Mitchell"), because the only difference between the Gatorade Label and claim 4 is the relative ordering of the indicia, high opacity, and light blocking layers, and a POSITA would have been motivated, with a reasonable expectation of success, to arrange those layers as claimed. EX1014, ¶¶ 108-123. Patent Owner contends that Ground 2 fails because (1) I had not reviewed Mitchell at my deposition; (2) the asserted motivations are conclusory and hindsight-driven, and I purportedly disavowed the "visibility" motivation; (3) Mitchell is non-recyclable, teaches away, and was distinguished during prosecution; (4) a POSITA would not modify a successful commercial product; and (5) there was no reasonable expectation of success in view of Petitioner's later-filed '094 application (EX2016). *See* POR, § B.1.a-b. In response, I disagree, as set forth below.

135. As an initial matter, at my deposition, I testified that I had not reviewed Mitchell. EX2011, 118:3-9. What I did review is the entirety of the prosecution history, including the Examiner's notation 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 addition, since then, I have reviewed Mitchell (EX1020) in its entirety, together with the prosecution history applying it (EX1002). My opinions are unchanged.

1. Claim 4

[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.

iii. The Combination Discloses Each Element of Claim 4

136. Claim 4 adds two requirements to claim 3, being, an indicia layer, and the high opacity layer disposed between the indicia layer and the light blocking layer. The Gatorade Label satisfies every limitation of claims 1 and 3 (*see supra* ¶¶ 13-80 and 86-93) and includes an indicia layer (*see supra* ¶¶ 81-85) – all three printed layers on the PET film. EX1014, ¶¶ 65-66, 80-81, 100; Figs. 5-6.

137. The sole difference from claim 4 is the position of the high opacity layer on the label. In the Gatorade Label samples, the aluminum light blocking layer sits between the PET film and the titanium dioxide high opacity layer.

EX1014, ¶ 123; Figs. 5b-5d, 6b-6d, 15b-15d. Mitchell supplies the ordering teaching that bridges this difference, as the Examiner found, "[i]t would have been obvious ... 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." EX1002, 239. Printing the Gatorade Label's indicia, then the white ink, then the aluminum ink yields the claim 4 arrangement. EX1014, ¶ 123.

138. Patent Owner argues the applicant "traversed" the Mitchell rejection during prosecution. POR, 59. The prosecution history shows the applicant distinguished Mitchell on a different basis, namely, that Mitchell's pigments are "incorporated into the core layer polymer" and "would contaminate the polymer flake," whereas the claimed labels use inks "removed by washing." EX1002, 337. The applicant never disputed the Examiner's *layer-ordering* finding. In Ground 2, the recyclability feature Mitchell lacked is supplied by the Gatorade Label itself; Mitchell contributes only the ordering teaching the applicant never rebutted. The prosecution history of the '422 Patent is consistent with my opinion.

iv. Motivation to Combine

139. The most fundamental motivation is functional. A white, opaque layer positioned between the graphics and the metallic light blocking layer prevents the metallic layer from showing through and washing out the printed

colors. The '422 Patent confirms this was the art-recognized function of exactly this arrangement—the high opacity coating is applied "to provide a white opaque background for the label's artwork or graphics," and the specification describes printing "the graphics ... directly onto the film, followed by the high opacity layer (e.g., a white ink) and then the light blocking layer." EX1001, 19:15-23. Example 5 reports that labels so constructed showed indicia colors "more vibrant." EX1001, 27:35-39. The benefit of the claim 4 ordering was not the '422 Patent's invention – it was the known reason a printer places white between graphics and a metallic layer, as the Examiner found. EX1002, 239; *see* EX1014, ¶¶ 117-122.

140. Patent Owner characterizes my deposition testimony (EX2011, 239:12-241:2) as disavowing this motivation. POR, 59-60. It was not. I affirmed the motivation: "Q. ... the motivation and reason for changing the configuration of these labels would be to allow for visibility of the label? A. Yeah." EX2011, 240:4-9. The testimony Patent Owner cites concerned a different question — whether reordering would make the label *as a whole* "more visible." EX2011, 240:10-241:2. The label as a whole is visible in either configuration; as I explained then, the relevant question is "what you would see or not see when the labels were flipped relative to the indicia layer, relative to ... the metallic look or the white pigments." EX2011, 240:15-21. That is the point of the claim 4 ordering, it governs how the printed graphics appear, "ensur[ing] the printing is visible"

(EX1002, at 239) against "a white opaque background" (EX1001, 19:15-20). My testimony distinguished visibility of the label from visibility of the printing; it did not disavow the motivation.

141. The claim 4 ordering is also one of a small, finite set of known arrangements that the '422 Patent itself presents as interchangeable. Figures 1A-1E depict five different orderings of the same three layers – including the claim 4 arrangement (Fig. 1C) – without attributing criticality, data, or advantage to any one of them, and the '422 Patent offers the orderings as alternatives ("the graphics may be printed directly onto the film, followed by the high opacity layer ... and then the light blocking layer," or "[a]lternatively ... on top of the white opaque background"). EX1001, Figs. 1A-1E; 19:20-26. Selecting among a handful of art-recognized layer sequences, for the known white-backdrop benefit, is a routine design choice.

142. Patent Owner's argument that a POSITA would not modify a successful commercial product (POR, 54) misunderstands how these labels are made. Layer sequence is not a fixed attribute of the product; it is a press-configuration choice made job by job. EX1013, ¶ 59, 65. Changing the order of the Gatorade Label's layers "is simply a matter of changing the ink printed within each printing station on the press." EX1013, ¶ 59. A POSITA implementing the

claim 4 ordering would be exercising an ordinary configuration option of the very process by which the label was made – not redesigning the product.

143. Patent Owner's own evidence reinforces these motivations. In support of its objective-indicia arguments, Patent Owner submitted evidence that, before the priority date, the market was actively demanding recyclable, light-blocking shrink labels, including a 2019 statement attributed to Nestlé that no such solution then existed. POR, 64. Thus, the design need was recognized and pressing before the priority date which is precisely what prompts a POSITA to pursue known solutions, such as the Gatorade Label's construction, and art-recognized refinements such as the claimed layer ordering recognized by Mitchell. The '422 Patent's Background concedes the same market forces, and that markets "aspire to utilize recyclable packaging" and "require light protective packaging." EX1001, 1:14-23.

v. Reasonable Expectation of Success

144. A POSITA would have had a reasonable expectation of success of modifying the Gatorade Label because the implementation adds no layers, removes no layers, and introduces no new materials. The same PET film and the same indicia, white, and silver inks are printed in a different station sequence on the same press. Every layer of the resulting construction is one the Gatorade Label already demonstrates can be printed, shrunk, and washed. Reordering print

stations is among the most routine operations in gravure label printing. EX1014, ¶ 122; EX1013, ¶¶ 59, 65.

145. Patent Owner argues there was no reasonable expectation of success because, in its reading of Petitioner's later-filed '094 application (EX2016), two samples with different layer orders exhibited different transmittance. POR, 61-63. I disagree, for several reasons. *First*, as a matter of basic optics, light reaching the product must pass through every layer of the stack regardless of the sequence in which the layers were printed; the dominant attenuator, the aluminum layer, attenuates wherever it sits. A POSITA would expect a reordered stack of the same layers at the same coat weights to continue providing substantial light blocking, and EX2016 concerns neither the Gatorade Label's materials nor its coat weights. *Second*, the '422 Patent itself refutes any suggestion of unpredictability. Indeed, the '422 Patent presents five layer orderings as undifferentiated alternatives (Figs. 1A-1E) with no data or statement suggesting the claim 4 ordering performs differently. If reordering produced dramatic, unpredictable changes, the '422 Patent's own specification would be inexplicable.

146. Patent Owner's "teaches away" argument, that Mitchell is non-recyclable and contemplates label removal, does not change my opinion. POR, 56-57. Ground 2 relies on Mitchell solely for the *ordering* of the printed layers; the film, inks, and recyclability of the combination come from the Gatorade Label. In

that regard, having reviewed Mitchell in its entirety, I find nothing in it that criticizes or discourages a POSITA from positioning a white/metallization layer between printed graphics and a light blocking layer, and Patent Owner identifies no such passage. My deposition testimony is consistent. I had no reason to dispute that Mitchell's own labels are not PET and not recyclable (EX2011, 118:10-17), and the prosecution history says as much (EX2011, 239:1-10) – none of which bears on applying Mitchell's ordering teaching to the already-recyclable Gatorade Label.

147. Accordingly, it remains my opinion that claim 4 would have been obvious over the Gatorade Label in view of the knowledge of a POSITA, including Mitchell.

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

148. In my First Declaration, I opined that claim 4 would have been obvious over the Gatorade Label in view of the Febreze Label, because the Febreze Label is a shrink sleeve label that is produced and sold publicly by the same manufacturer since 2018, the printed stack of the Febreze Label embodies the very layer arrangement claim 4 recites, and a POSITA would have been motivated, with a reasonable expectation of success, to implement that known arrangement in the Gatorade Label. EX1014, ¶¶ 124-141. Patent Owner contends

that Ground 3 fails because (1) the motivations are conclusory and hindsight-driven, for the same reasons advanced against Ground 2; (2) there is no evidence the Febreze Label's film is PET or that the Febreze Label is recyclable, and the Febreze product is an aerosol air-freshener can rather than a recyclable beverage bottle; and (3) there was no reasonable expectation of success in view of EX2016. POR, § C.1.a-c. In response, I disagree for the following reasons.

1. Claim 4

[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.

i. The Combination Discloses Each Element of Claim 4

149. As set forth in Ground 2 above, every limitation of claims 1 and 3, and the indicia layer, are supplied by the Gatorade Label. The sole difference — the position of the high opacity layer — is supplied by the Febreze Label. Indeed, my cross-sectional analyses of Febreze sample 3191115 show the high opacity (titanium dioxide) layer located between the PET film side of the stack and the aluminum light blocking layer, with the indicia inks between the film and the high opacity layer. *See* EX1014, Fig. 5a and 6a. That is, the high opacity layer is disposed between the indicia layer and the light blocking layer, exactly as claim 4 recites. *See* EX1014, ¶ 126. Implementing that arrangement in the Gatorade Label,

printing indicia, then white, then aluminum, yields every limitation of claim 4. *See* EX1014, ¶ 141.

150. Patent Owner's criticisms that the Febreze Label's film was not shown to be PET, that the Febreze Label was not shown to be recyclable, and that the Febreze product is an aerosol can in a different market (POR, 72) are beside the point. Ground 3 relies on the Febreze Label solely for the *arrangement* of the indicia, high opacity, and light blocking layers, a teaching independent of the film's polymer, the label's recyclability, and the container's contents. The recyclable PET shrink label of the combination is the Gatorade Label; the Febreze Label demonstrates that the claimed layer ordering was a known, commercially practiced configuration before the priority date. The composition of the Febreze film and the recyclability of an aerosol can have no bearing on that ordering teaching.

ii. Motivation to Combine

151. The motivations analysis for Ground 2 applies equally and is incorporated here. *See supra* ¶¶ 139-143. In addition, the Gatorade and Febreze Labels are shrink sleeve labels manufactured and publicly sold by the same entity using the same gravure printing technology, each employing metal-particulate (aluminum) light blocking ink and titanium dioxide white ink. EX1013, ¶¶ 53-66. A POSITA, and certainly the labels' common manufacturer, would have been

aware of both constructions and would have recognized them as variants of the same printed-stack architecture, differing in layer sequence. The layer-ordering principle is product-agnostic, it concerns how printed graphics appear over a metallic layer, a consideration common to every shrink sleeve label regardless of what the underlying container holds. That the Febreze container is an aerosol can is irrelevant to where, in a printed stack, a printer places the white ink relative to the graphics and the metallic ink.

iii. Reasonable Expectation of Success

152. The reasonable-expectation analysis for Ground 2 applies equally and is incorporated here. *See supra* ¶¶ 144-146. Ground 3 makes the expectation of success stronger still, because the claim 4 arrangement is not merely a taught configuration, it is an arrangement the same manufacturer had already implemented in a commercial shrink sleeve product, produced and sold in substantial quantities since 2018. EX1013, ¶¶ 61-63. A POSITA contemplating the claim 4 ordering would not have been predicting the outcome of an untried design; the Febreze Label demonstrated, in commercial practice, that indicia, white, and aluminum layers print and perform successfully in that sequence. Patent Owner's EX2016-based unpredictability argument fails here for the reasons given in *supra* ¶ 145, and for the additional reason that a configuration already

realized in a publicly sold product cannot plausibly be characterized as one a POSITA would have doubted could be achieved.

153. Accordingly, it remains my opinion that claim 4 would have been obvious over the Gatorade Label in view of the Febreze Label.

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

154. As set forth in my First Declaration, I understand that a claim is indefinite if its language might have several meanings and a POSITA would not be able to make a confident choice among them. EX1014, ¶ 142. For the reasons explained therein, it remains my opinion that a POSITA would not be informed, with reasonable certainty, of the scope of the phrase "wherein the recyclable shrink label is recyclable with a PET container," as recited in claims 1 and 19. I understand that Mr. Bushman agrees. *See* EX1013, ¶¶ 72-85.

155. I understand Patent Owner argues that the claims cannot be indefinite because I was able to analyze the challenged claims in the Grounds 1-3 analyses. POR, 76. I disagree. I have been advised by counsel that the ability to assess whether the prior art satisfies a disputed claim term does not resolve the separate question of whether the patent informs a POSITA, with reasonable certainty, of the scope of that term. Nothing in my analyses reflects a determination that the disputed term has a single, reasonably certain meaning.

IV. CONCLUSION

156. 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: 06-17-26

NAME: Dr. Michael Deible

SIGNATURE: 