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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte JOSEPH ALLEN MERKEL, TERESA MARIE MERKEL,
ANDREW CLEMENS FORSTHOEFEL, CLARE HAN, JOSHUA HAN,
MATTHEW CHARLES LEE, and SAMUEL ERVING GEELHOOD

Appeal 2025-000088
Application 17/349,995
Technology Center 1700

Before JEFFREY B. ROBERTSON, RAE LYNN P. GUEST, and
LILAN REN, *Administrative Patent Judges*.

GUEST, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Pursuant to 35 U.S.C. § 134(a), Appellant¹ appeals from the
Examiner’s decision to reject claims 4–7, 11–13, and 21–25. *See* Non-Final
Act. 1. We have jurisdiction under 35 U.S.C. § 6(b).

We affirm.

¹ “Appellant” refers to “applicant” as defined in 37 C.F.R. § 1.42. Appellant identifies the real party in interest as Joseph Allen Merkel. Appeal Br. 2.

CLAIMED SUBJECT MATTER

The invention is directed to solar-reflective and color-changing composition, for example for use with playground equipment. Spec. ¶ 3. According to the Specification, the composition reflects sunlight to provide a cooler surface and changes color at a predefined temperature to provide a visible warning to avoid possible burns. *Id.* ¶ 17. Claims 4 and 11, reproduced below, illustrate the claimed subject matter:

4. A composition of matter, comprising:
 - a solar-reflective pigment comprising:
 - zinc oxide, wherein the zinc oxide is between approximately five percent by weight (~5wt%) and approximately twenty-five percent by weight (~25wt%) of the composition of matter;
 - titanium dioxide, wherein the titanium dioxide is between approximately seven percent by weight (~7wt%) and approximately fifteen percent by weight (~15wt%) of the composition of matter; and
 - an IR-reflective pigment that prevents the composition of matter from being white, wherein the IR-reflective pigment is between approximately two percent by weight (~2wt%) and approximately twelve percent by weight (~12wt%) of the composition of matter;
 - a thermochromic pigment having a material property of changing from a first color to a second color when above a threshold temperature, the first color being visibly different than the second color, the thermochromic pigment further changing from the second color to the first color when below the threshold temperature, wherein the thermochromic pigment is between approximately two percent by weight (~2wt%) and approximately ten percent by weight (~10wt%) of the composition of matter; and
 - a base being a remaining weight percent portion of the composition of matter.

11. A composition of matter, comprising:

a solar-reflective pigment comprising:
 zinc oxide, wherein the zinc oxide is
approximately 6.45 weight percent (~6.45wt%) of the
composition of matter;
 titanium dioxide, wherein the titanium dioxide is
~8.06wt% of the composition of matter; and
 an IR-reflective pigment that prevents the
composition of matter from being white, wherein the IR-
reflective pigment is ~2.42wt% of the composition of matter;
 a thermochromic pigment having a material property of
changing from a first color to a second color when above a
threshold temperature, the first color being visibly different
than the second color, the thermochromic pigment further
changing from the second color to the first color when below
the threshold temperature, wherein the thermochromic pigment
is ~2.42wt% of the composition of matter; and
 a base, wherein the base is ~80.65wt% of the
composition of matter.

Appeal Br. 32–33, Claims App.

REFERENCES

The Examiner relies on the following references to reject the claims:

Name	Reference	Date
Li	US 2019/0330523 A1	Oct. 31, 2019
Shin (translation of record)	KR 10-2010-0039776 A	Apr. 16, 2010
Ram	WO 2018/204640 A1	Nov. 08, 2018
Ryan	Mark M. Ryan Jr., <i>IR-Reflective Pigments: A Black Rainbow of Options</i> , PC Magazine, www.pcmag.com/articles/102920-ir-reflective-pigments-a-black-rainbow-of-options	Jan. 03, 2017

REJECTIONS

The Examiner maintains the following rejections:²

1. Claims 4–7 are rejected under 35 U.S.C. § 103 as being unpatentable over Shin and Ryan. Non-Final Act. 4.
2. Claims 5–7 are rejected under 35 U.S.C. § 103 as being unpatentable over Shin, Ryan, and Ram. Non-Final Act. 7.
3. Claims 4–7, 11–13, and 21–25 are rejected under 35 U.S.C. § 103 as being unpatentable over Li and Ryan. Non-Final Act. 8.
4. Claims 5–7 and 21–23 are rejected under 35 U.S.C. § 103 as being unpatentable over Li, Ryan, and Ram. Non-Final Act. 14.

OPINION

We review appealed rejections for reversible error based on the arguments and evidence Appellant provides for each issue Appellant identifies. 37 C.F.R. § 41.37(c)(1)(iv) (2022); *Ex parte Frye*, 94 USPQ2d 1072, 1075 (BPAI 2010) (precedential) (*cited with approval in In re Jung*, 637 F.3d 1356, 1365 (Fed. Cir. 2011) (“[I]t has long been the Board’s practice to require an applicant to identify the alleged error in the examiner’s rejections.”)). “After evidence or argument is submitted by the applicant in response, patentability is determined on the totality of the record, by a preponderance of evidence with due consideration to persuasiveness of argument.” *In re Oetiker*, 977 F.2d 1443, 1445 (Fed. Cir. 1992).

Initially, Appellant presents arguments with respect to claims 4 and 11, asserting that the remaining claims stand or fall together with

² The Examiner withdrew the rejection of claims 11–13, and 21–25 under the first rejection, and claims 21–23 under the second rejection.

claims 4 and 11. Appeal Br. 13–30. Appellant does not advance any additional arguments for the separate rejections of dependent claims, instead they assert that the separately rejected dependent claims are patentable for the same reasons. *Id.* at 30. Accordingly, we focus our discussion on representative independent claims 4 and 11. Any claim not separately argued will stand or fall with its respective independent claim. *See* 37 C.F.R. § 41.37(c)(1)(iv).

Claim 4 — Shin/Ryan

The Examiner’s rejection of claim 4 over Shin and Ryan is set forth on pages 4–6 and of the Non-Final Action. The Examiner finds that Shin teaches a temperature-sensitive color change composition comprising 8–10% by weight zinc oxide, 10–15% by weight titanium oxide, and 10–22% by weight thermochromic pigment, in a base, which overlaps at least some portion of the recited ranges for these elements. Non-Final Act. 4; Ans. 5. The Examiner finds that Shin does not teach an IR-reflective pigment or the claimed amount thereof. Non-Final Act. 4–5; Ans. 6. The Examiner finds that Ryan teaches IR-reflecting pigments that can be used in compositions to prevent the color from being white and to reduce the temperature of colored materials relative to standard pigments. Non-Final Act. 5–6 (citing Ryan 3); Ans. 6. The Examiner finds that the amount of IR-reflecting pigment is a result effective variable that determines the total solar reflectance (TSR) of the composition, and thus one skilled in the art would have determined an optimum amount via routine experimentation. Non-Final Act. 5 (citing, e.g., Ryan 6, Figs. 6, 9); Ans. 7. Thus, the Examiner concludes that it would have been obvious to a skilled artisan to modify the composition of Shin to include IR-reflective pigments to prevent the composition from being a

white color, and that it would result in reducing the temperature of colored materials relative to standard pigments. Non-Final Act. 5–6; Ans. 7.

Appellant argues that Shin fails to establish that the claimed ingredients “are result effective variables for temperature mitigation, friction, or impact resistance,” which are the particularly alleged inventive effects set forth by Appellant in the Specification. Appeal Br. 21. Appellant also argues that the Examiner has not established that the claimed ranges are prima facie obvious over the prior art. In particular, Appellant argues that, although Ryan teaches a relationship between TSR and temperature differences and “Ryan teaches that TSR affects temperature,” but “Ryan does not teach that wt% of ingredients affect temperature.” Appeal Br. 19. According to Appellant, Ryan does not teach the direct relationship between the amount of ingredients and temperature.

Appellant’s arguments are not persuasive of Examiner error. With respect to the recited ranges for the amounts of zinc oxide, titanium oxide and thermochromic pigment, the Examiner has found that Shin teaches overlapping or very close ranges. The Examiner is correct that one of ordinary skill would expect similar properties and similarly successful outcomes where the ranges touch or overlap. *Titanium Metals Corp. of Am. v. Banner*, 778 F.2d 775, 783 (Fed. Cir. 1985) (holding that a prima facie case of obviousness exists even when the “proportions [of metal content in alloys are] so close that prima facie one skilled in the art would have expected them to have the same properties”); *In re Peterson*, 315 F.3d 1325, 1330 (Fed Cir. 2003) (“[T]he existence of overlapping or encompassing ranges shifts the burden to the applicant to show that his invention would not have been obvious.”).

With respect to the IR-reflective pigment, the Examiner found that Ryan teaches that the amount of IR-reflective pigment in a composition directly affects the TSR. This fact supported by the teachings of Ryan. In particular, as noted by the Examiner, Figure 6 of Ryan demonstrates a direct correlation between IR-reflective pigment and TSR. *See* Ryan 4, second full paragraph (“Figure 6 examines the relationship between pigment loading for the two IR black pigments over different substrates. The TSR measurements for the PBr29 and PBk32 were plotted on the vertical axis versus the [pigment to binder] ratio for each along the horizontal axis. . . . TSR can be maximized by optimizing pigment loading for visual and IR opacity.”), Fig. 6.

Accordingly, the skilled artisan would have been capable of adjusting the amount of IR-reflective pigment to obtain any desired amount of TSR, including a TSR that would occur when the IR-reflective pigment falls within the particularly claimed range. *In re Geisler*, 116 F.3d 1465, 1470 (Fed. Cir. 1997) (“[I]t is not inventive to discover the optimum or workable ranges by routine experimentation.” (quoting *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955))); *Pfizer, Inc. v. Apotex, Inc.*, 480 F.3d 1348, 1368 (Fed. Cir. 2007) (holding discovery of an optimum value of a variable in a known process is usually obvious). The Examiner’s reasoning is sound and sufficient to establish that the recited amount of IR-reflective pigment would have been prima facie obvious.

Because the amounts would have been prima facie obvious, it is of no moment that the art does not teach identifying workable or optimal amounts for the exact same purpose as did the inventors. *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 420 (2007) (“[A]ny need or problem known in the field

of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed.”); *see also In re Kemps*, 97 F.3d 1427, 1430, (Fed. Cir. 1996) (holding the reason to modify a reference “does not have to be identical to that of the applicant to establish obviousness”); *In re Beattie*, 974 F.2d 1309, 1312, (Fed. Cir. 1992) (“As long as some motivation or suggestion to combine the references is provided by the prior art taken as a whole, the law does not require that the references be combined for the reasons contemplated by the inventor.”).

In light of the strong *prima facie* case, Appellant has the burden to show secondary considerations such as unexpected results or criticality to demonstrate nonobviousness. *See In re Huang*, 100 F.3d 135, 139, 40 USPQ2d 1685, 1688 (Fed. Cir. 1996) (“This court and its predecessors have long held, however, that even though applicant’s modification results in great improvement and utility over the prior art, it may still not be patentable if the modification was within the capabilities of one skilled in the art, unless the claimed ranges ‘produce a new and unexpected result which is different in kind and not merely in degree from the results of the prior art.’”) (*quoting Aller*, 220 F.2d at 456; citing *In re Woodruff*, 919 F.2d 1575, 1578 (Fed. Cir. 1990)).

In this regard, Appellant argues that the claims are nonobvious in light of the experimental findings in the Specification, further supported by six different Declarations. Appeal Br. 23–30. Appellant contends that the claimed invention demonstrates unexpected results, which were contrary to accepted and conventional wisdom, and which were not predictable. *Id.* Appellant argues that such results show significant and practical advantages that are unrecognized in the prior art. *Id.* We are not persuaded that the data

submitted by Appellant, both in the Specification and in the Declarations (which are substantially identical) are sufficient to establish that the ranges recited in the claims demonstrate unexpected results that would render the claimed ranges nonobvious to a skilled artisan. We discuss the data in detail below.

Appellant's declarations and the Specification report that three properties of the claimed composition are "contrary to accepted wisdom" or different than what "one would expect." *See* Declarations³ ¶¶ 24, 26, 28, 30, 32, 35, 44, 55. However, none of these assertions are supported by factual evidence. We have no evidentiary basis for giving substantial weight to Appellant's position as to what a skilled artisan would have expected or what is "accepted wisdom." "The Board has broad discretion as to the weight to give to declarations offered in the course of prosecution." *In re Am. Acad. of Sci. Tech Ctr.*, 367 F.3d 1359, 1368 (Fed. Cir. 2004). "[T]he Board is entitled to weigh the declarations and conclude that the lack of factual corroboration warrants discounting the opinions expressed in the declarations." *Id.* Indeed, a lack of factual support for expert opinion on factual determinations may render the testimony of little probative value in a patentability determination. *Ashland Oil, Inc. v. Delta Resins & Refractories, Inc.*, 776 F.2d 281, 294 (Fed. Cir. 1985); *see also Velandier v. Garner*, 348 F.3d 1359, 1371 (Fed. Cir. 2003) ("In giving more weight to prior publications than to subsequent conclusory statements by experts, the Board acted well within [its] discretion.").

³ As the declarations are substantially identical, we cite to paragraph numbering of the Declaration of Clare H. Han, executed June 16, 2023, who is a named inventor, as representative.

Moreover, without being able to ascertain what is expected, Appellant has not demonstrated that the results are different in kind, rather than merely degree from those expectations. Optimization, by definition, is determining the best and most favorable results within the teachings of the prior art.

With respect to unexpected heat mitigating effects, Appellant contends that it is unexpected that “simply adding more zinc oxide, titanium dioxide, or IR-reflective pigments is counterproductive to heat-mitigating effects.” Declaration ¶ 30. Appellants identify that, through experimentation, they discovered “a somewhat-unpredictable sweet spot” or “best mode” for heat protection and solar reflectivity, as determined by surface temperature measurements. Declaration ¶¶ 31, 42. Appellant’s identify a lack of direct correlation between concentration of materials and surface temperature readings as conferring patentability of the recited ranges of materials due to unpredictability. Declaration ¶¶ 35, 36, 40, 41.

Because properties normally vary to some degree with the amounts of the various materials used in a formulation, that one formulation has a property somewhat “superior” in comparison to somewhat varied formulations does not necessarily mean the result would have been unexpected. An appellant must establish that the property would have been viewed as unexpected by one of ordinary skill in the art. *See Pfizer*, 480 F.3d at 1371 (“[A]ny superior property must be *unexpected* to be considered as evidence of non-obviousness,” and a proper evaluation considers what properties were expected.). As noted above, we have no basis for finding it unexpected that a material could be optimized for various purposes. Thus, we find Appellant’s test data to be little more than establishing workable or optimal ranges via routine experimentation consistent with the prior art.

Nor do we consider the data itself to be particularly compelling for the reasons primarily set forth by the Examiner. Ans. 14–18. Appellant initially shows that a formulation having 2.91 wt% IR-reflective blue pigment measured a lower surface temperature than a formulation having 9.1 wt% IR-reflective blue pigment (triple the amount). Declaration ¶¶ 34, 36. However, Appellant does not attest to what the other components of these formulation are, whether they are within or outside of the ranges taught by the prior art, and whether they are consistent for both formulations. Comparative examples must be truly comparative. *In re Dunn*, 349 F.2d 433, 439 (CCPA 1965) (holding a comparison inadequate because the cause and effect sought to be proven was lost in a welter of unfixed variables.). Nor is this example sufficient to show criticality of the claimed range, as both IR-reflective pigments fall within the recited range. “In general, an applicant may overcome a *prima facie* case of obviousness by establishing ‘that the [claimed] range is critical, generally by showing that the claimed range achieves unexpected results relative to the prior art range.’” *Peterson*, 315 F.3d at 1330 (quoting *In re Geisler*, 116 F.3d 1465, 1469–70). The showing must be commensurate in scope with the claimed range or, in other words, an applicant must show that the unexpected result occurs throughout the entire claimed range. *Id.*; see also *In re Harris*, 409 F.3d 1339, 1344 (Fed. Cir. 2005) (“Harris needed to show results covering the scope of the claimed range”). The showing must also present enough data points within the prior art range, but outside the claimed range, to establish that the unexpected property does not occur outside the claimed range. *In re Hill*, 284 F.2d 955, 958–59 (CCPA 1960). Here, the Specification and the

Declarations provide too little data to prove unexpected results over the prior art teachings.

Appellant then shows a second experiment where a formulation having 7.7 wt% IR-reflective yellow pigment, 7.7 wt% titanium dioxide, 6.1 wt% zinc oxide, and 1.9 wt% thermochromic pigment resulted in a higher surface temperature than a formulation having 2.4 wt% IR-reflective yellow pigment, 8.1 wt% titanium dioxide, 6.5 wt% zinc oxide, and 2.4 wt% thermochromic pigment. Declaration ¶¶ 38, 39. While this example includes a description of some components of the formulations being compared (without attesting as to the balance of material in the tested formulations), the actual amounts of each component listed are altered in both formulations. Specifically, the amount of IR-reflective yellow pigment decreased from the first to the second comparative formulations, but the amounts of titanium dioxide, zinc oxide, and thermochromic pigment increased. Thus, again, it is not clear from the record if there is a meaningful difference in results. *Dunn*, 349 F.2d at 439. Moreover, in the first example, the amount of thermochromic pigment fell completely outside of the amounts recited in the claims. Any contribution that the amounts of non-reflective materials may have played in surface temperature is entirely unclear on this record.

Appellant then submits evidence comparing the degree of friction between an “unpainted surface,” presumably although not expressly reported to be a surface of a playground slide, and a “painted (or coated)” surface. Declaration ¶¶ 46–53. Appellant demonstrates an increased average measured force required to slide a fixed weight for two materials (namely denim and “athletic shorts” material). Declaration ¶¶ 49-51. Appellant

reported increased measured force for the unpainted surface over the painted surface. In this case, in which Appellant does not identify the formulation for the painted surface (nor the material used for the unpainted surface for clear direct comparison), we have no way to understand if the formulation falls within or outside of the claimed range or what other contents, and in what concentrations, the materials of any given “paint,” “coating,” or “surface” may have or have not contributed to a decrease in friction. Accordingly, without more information, Appellant’s demonstration of a difference here is not persuasive that the recited claimed ranges of materials is not obvious.

Finally, Appellant presents evidence of tested “impact resistance.” Declaration ¶¶ 56–58. Although the inventors subjected “several of the coatings” to impact testing, of which the exact components and amounts thereof have not be identified, “[f]or one of the samples” more panels passed the impact testing at the highest impact force setting and fewer passed at a lower impact force setting, which is noted as being surprising. *Id.* at ¶¶ 56–57. The example with the anomalous results, comprised 2.4 wt% IR-reflective pigment, 8.1 wt% titanium dioxide, 6.5 wt% zinc oxide, and 2.4 wt% thermochromic pigment (without attesting as to the balance of material in the tested formulations). Yet, a single example with an allegedly different result is insufficient to demonstrate non-obviousness, as it is not clearly compared with formulations outside of the range, within the full scope of the claims, or different that those taught by the prior art. *Peterson*, 315 F.3d at 1330.

Accordingly, we agree with the Examiner that claim 4 is not patentable under 35 U.S.C. § 103 based on the combination of Shin and Ryan.

Claim 4 — Li/Ryan

The Examiner’s rejection of claim 4 over Li and Ryan is set forth on pages 8–11 and of the Non-Final Action. The Examiner finds that Li teaches a temperature-sensitive color change composition comprising about 1 to about 30% by weight thermochromic pigment (a temperature sensitive material) as well as about 1 to about 30% of a stabilizer. Non-Final Act. 9; Ans. 12. The Examiner finds that the stabilizer may be an “ultraviolet light stabilizer,” which may comprise “one or more of carbon black (i.e., a weak IR-reflective pigment), zinc oxide, and titanium dioxide.” Non-Final Act. 9; Ans. 12. Thus, we agree with the Examiner that the prior art supports a finding of a composition that overlaps the claimed ranges of a thermochromic pigment, zinc oxide, titanium oxide and a weak IR-reflective pigment. The Examiner finds that Li does not teach an amount of IR-reflective pigment that “prevents the composition from being [a] white color” or the claimed amount thereof. Non-Final Act. 9; Ans. 6. Thus, the Examiner further relies on Ryan in the same way discussed above for the prior rejection of claim 4. Non-Final Act. 9–11; Ans. 6–8.

Appellant argues that Li fails to establish that the claimed ingredients “are result effective variables for temperature mitigation, friction, or impact resistance,” which are the particularly inventive effects set forth by Appellant in the Specification. Appeal Br. 20. Appellant also argues that Li’s “thermochromic polymer” is not the same as the recited “thermochromic pigment.” Appeal Br. 22. Appellant argues that the

Examiner has not established that the claimed ranges are prima facie obvious over the prior art. In particular, Appellant argues that “Li never teaches any range at all (let alone an overlapping range)” for zinc oxide, titanium dioxide, or an IR-reflective pigment, and that there is “a complete absence of any range for” these components. Appeal Br. 22–23. Appellant argues that the carbon black taught by Li is not an IR-reflective pigment. Appeal Br. 20. In response to which, the Examiner directs us to Figure 2 of Ryan, which shows that carbon black does have some reflectance (less than about 10%). Ans. 13–14.

Appellant’s arguments are not persuasive of Examiner error. The Examiner explained that Li teaches temperature sensitive material (pigment) within a polymer base to form a thermochromic polymer composition. Non-Final 9; Ans. 12; *see* Li ¶¶ 7, 22. With respect to the recited ranges for the amounts of zinc oxide, titanium oxide and thermochromic pigment, the Examiner has found that Li teaches overlapping or very close ranges. Non-Final 9; Ans. 12. We find this supported by the evidence of record that teaches “one or more of zinc oxide, titanium oxide, and carbon black” in an amount from about 1 to about 30% by weight. *See* Li ¶¶ 27, 30, 31, claims 11, 14. A skilled artisan would understand that the prior art encompasses a formulation that includes all three ingredients and that the amounts of those ingredient could vary but not such that the total of the three would be less than 1% or more than 30%. Thus, the individual range for each component would overlap the recited ranges. The Examiner is correct that one of ordinary skill would expect similar properties and similarly successful outcomes where the ranges touch or overlap. *Peterson*, 315 F.3d at 1330.

With respect to the IR-reflective pigment, we agree with the Examiner that carbon black is a weak IR-reflective pigment, and the claims are not limited to any particular degree of reflectivity for the recited pigment. *See* Ryan, Fig. 2. Further, the Examiner relies on the teachings of Ryan for the IR-reflective pigment. Non-Final Act. 9–11; Ans. 6–8. Appellant’s arguments with respect to Ryan are the same as those addressed above with respect to the prior rejection. Appeal Br. 19. Thus, for the same reasons, we find that the skilled artisan would have been capable of adjusting the amount of IR-reflective pigment to obtain any desired amount of TSR, including a TSR that would occur when the IR-reflective pigment falls within the particularly claimed range. Again, the Examiner’s reasoning is sound and sufficient to establish that the recited amount of IR-reflective pigment would have been *prima facie* obvious.

As with the prior rejection, in light of the strong *prima facie* case, Appellant has the burden to show secondary considerations such as unexpected results or criticality to demonstrate nonobviousness. Appellant relies on the same reasoning and evidence found unpersuasive of nonobviousness as discussed in detail above. Appeal Br. 23–30.

Accordingly, we agree with the Examiner that claim 4 is not patentable under 35 U.S.C. § 103 based on the combination of Li and Ryan.

Claim 11 — Li/Ryan

Claim 11 recites a specific amount for each ingredient (as opposed to a range). For the reasons noted above, the Examiner has found that the more specific amounts of each ingredient recited in claim 11 are also encompassed by the broadest ranges taught by Li. Non-Final Act. 11–12; Ans. 5–6. Thus, the specific amounts recited in claim 11 are *prima facie* obvious in

view of Li and Ryan for the same reasons as discussed above for claim 4. Appellants arguments that the amounts taught by the reference are not specific enough for the narrowly recited amounts (*see generally* Appeal Br. 22–23; Reply Br. 6–7) do not negate the prima facie case that the amounts would nonetheless be obvious.

Appellant presents no separate argument regarding unexpected results for claim 11 from those discussed above for claim 4. Appeal Br. 23–30. Although claim 11 includes amounts of components similar to some of the formulations discussed in the Declarations, we are not persuaded that the Declarations demonstrate criticality or unexpected results with respect to the particular formulation of claim 11, substantially for the reasons noted above. Further, the formulations that are similar recite the same amount of IR-reflective pigment, titanium dioxide, zinc oxide, and thermochromic pigment (*see, e.g.*, Declaration ¶¶ 39, 57), but do not clearly indicate that the remainder of the formulation was a base, such that it is unclear whether the formulations relied upon in evidence are commensurate with the scope of claim 11.

Accordingly, we agree with the Examiner that claim 11 is not patentable under 35 U.S.C. § 103 based on the combination of Li and Ryan.

CONCLUSION

The Examiner's rejections are AFFIRMED.

DECISION SUMMARY

The following table summarizes our decision:

Claim(s) Rejected	35 U.S.C. §	Reference(s)/Basis	Affirmed	Reversed
4–7	103	Shin, Ryan	4–7	
5–7	103	Shin, Ryan, Ram	5–7	
4–7, 11–13, 21–25	103	Li, Ryan	4–7, 11–13, 21–25	
5–7, 21–23	103	Li, Ryan, Ram	5–7, 21–23	
Overall Outcome			4–7, 11–13, 21–25	

TIME PERIOD FOR RESPONSE

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a). *See* 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED