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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte TAE HO YOON, HYUNG SANG PARK, and YONG MIN YOO

Appeal 2018-007021
Application 12/178,300
Technology Center 1700

Before CATHERINE Q. TIMM, JEFFREY R. SNAY, and
MICHAEL G. MCMANUS, *Administrative Patent Judges*.

TIMM, *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 1, 3–5, 8, 9, 11–18, 29, and 30. *See* Final Act. 1. We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

¹ We use the word “Appellant” to refer to “applicant” as defined in 37 C.F.R. § 1.42. Appellant identifies the real party in interest as the assignee of record, ASM Genitech Korea Ltd. Appeal Br. 3.

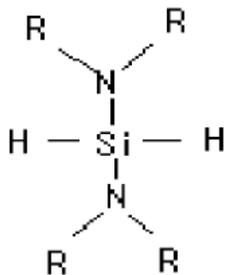
CLAIMED SUBJECT MATTER

The claims are directed to a method of depositing a silicon oxide film over a substrate in a cycle of a plasma enhanced atomic layer deposition (PEALD) process. *See, e.g.*, claim 1. The process involves supplying a silicon source gas to a reactor and generating an oxygen plasma after stopping the supply of the silicon source gas. *Id.* The silicon source gas is N,N,N',N'-tetraethyldiaminosilane ($\text{SiH}_2[\text{N}(\text{C}_2\text{H}_5)_2]_2$). The oxygen gas may be supplied substantially continuously throughout the process or supplied only when generating the oxygen plasma. Spec. ¶ 25. The process is shown in the flowchart of Figure 1. Spec. ¶¶ 19–27. Figure 4 depicts a second embodiment with further steps. The second embodiment has further cycles where the gases are supplied in a different direction. Spec. ¶¶ 40–41.

Claim 1, reproduced below with references to the Specification and Figures to exemplify the scope of the claim, is illustrative of the claimed subject matter:

1 A method of depositing a silicon oxide film over a substrate, the method comprising one or more plasma enhanced atomic layer deposition cycles [Fig. 1 (steps 110–140); Fig. 4 (e.g., 1st cycle)], each of the one or more plasma enhanced atomic layer deposition cycles [e.g. 1st cycle] comprising:

supplying a silicon source gas comprising N,N,N',N'-tetraethyldiaminosilane ($\text{SiH}_2[\text{N}(\text{C}_2\text{H}_5)_2]_2$) over a substrate in a reactor [Fig. 1 (step 110); Fig. 4 (t1)]; and



[sic²]

providing an oxygen-containing gas [Spec. ¶ 25 (only at Fig. 1 step 110 or continuously as shown in Fig. 4 (R gas))] and generating an oxygen plasma over the substrate in the reactor [Fig. 1 (step 130)],

such that the silicon oxide film comprises at least one of atomic nitrogen (N) and carbon (C) at less than 5 atomic%,

wherein a deposition rate for at least one of the one or more deposition cycles is from 1.1 Å/cycle to 2.5 Å/cycle, and

wherein generating the oxygen plasma [Fig. 1 (step 130)] comprises generating the oxygen plasma after stopping supply of the silicon source gas [Fig. 1 (130); Fig. 4 (t2)].

Appeal Br. 21 (Claims Appendix).

² Claim 1 recites both N,N,N',N'-tetraethyldiaminosilane (SiH₂[N(C₂H₅)₂]₂) and a generic chemical formula of which N,N,N',N'-tetraethyldiaminosilane (SiH₂[N(C₂H₅)₂]₂) is a species. *See, e.g.*, Spec. ¶¶ 22–23. On April 6, 2016 Appellant filed an amendment adding N,N,N',N'-tetraethyldiaminosilane (SiH₂[N(C₂H₅)₂]₂) and deleting recitations associated with the generic formula, but did not delete the generic chemical formula itself. Given this history, we do not interpret claim 1 as requiring a diaminosilane separate from N,N,N',N'-tetraethyldiaminosilane (SiH₂[N(C₂H₅)₂]₂). Should prosecution continue, the generic formula should be deleted to avoid 35 U.S.C. § 112 issues.

REJECTIONS

The Examiner maintains the following rejections:

A. Claims 1, 3–5, 8, 11–13, 15–18, 29, and 30 under pre-AIA 35 U.S.C. § 102(e) as anticipated by Dussarrat '490³ as evidenced by Filmetrics;⁴

B. Claim 9 under pre-AIA 35 U.S.C. § 103(a) as obvious over Dussarrat '490;

C. Claim 14 under pre-AIA 35 U.S.C. § 103(a) as obvious over Dussarrat '490 in view of Androshuk;⁵

D. Claims 1, 3–5, 8, 9, 11, 15–18, 29, and 30 under pre-AIA 35 U.S.C. § 103(a) as obvious over Dussarrat '525⁶ in view of Lee⁷ and Park;⁸

E. Claims 12 and 13 under pre-AIA 35 U.S.C. § 103(a) as obvious over Dussarrat '525 in view of Lee and Park and further in view of Moghadam;⁹

F. Claim 14 under pre-AIA 35 U.S.C. § 103(a) as obvious over Dussarrat '525 in view of Lee, Park, and Moghadam, and further in view of Androshuk.

³ Dussarrat, US 2009/0075490 A1, published March 19, 2009.

⁴ *Refractive Index of SiO₂, Fused Silica, Silica, Silicon Dioxide, Thermal Oxide, Thermal Oxide*, [http://www.filmetrics.com/refractive-index-database/SiO₂/Fused-Silica-Silica-Silicon-Dioxide-Thermal-Oxide-ThermalOxide](http://www.filmetrics.com/refractive-index-database/SiO2/Fused-Silica-Silica-Silicon-Dioxide-Thermal-Oxide-ThermalOxide) (accessed 2015).

⁵ Androshuk et al., US 3,424,661, issued Jan. 28, 1969.

⁶ Dussarrat et al., WO 2006/097525 A2, published Sept. 21, 2006.

⁷ Lee et al., US 5,660,895, issued Aug. 26, 1997.

⁸ Park et al., US 2005/0223982 A1, published Oct. 13, 2005.

⁹ Moghadam et al., US 2004/0115898 A1, published June 17, 2004.

OPINION

Rejections A–C: The rejections relying on Dussarrat '490

The Examiner rejects claims 1, 3–5, 8, 11–13, 15–18, 29, and 30 under pre-AIA 35 U.S.C. § 102(e) as anticipated by Dussarrat '490 as evidenced by Filmetrics, rejects claim 9 under pre-AIA 35 U.S.C. § 103(a) as obvious over Dussarrat '490, and adds Androshuk to reject claim 14.

Appellant contends that the Examiner erred in relying on Dussarrat '490 because Dussarrat '490 is not available as prior art. Appeal Br. 8–11; Reply Br. 3–5. To support the contention, Appellant relies on evidence of prior inventorship submitted in two Declarations (First Yoo Declaration¹⁰ and Second Yoo Declaration¹¹).

The Examiner determines that Appellant's evidence is insufficient to show prior inventorship because the evidence does not show that Appellant conceived of a process with a deposition rate over the entire range of claim 1, i.e., the range of 1.1 to 2.5 Å/cycle. Ans. 3–6.

The sole issue on appeal for the rejections relying on Dussarrat '490 is: Has Appellant identified a reversible error in the Examiner's determination that Appellant's evidence of prior inventorship is insufficient to remove Dussarrat '490 as prior art evidence?

Appellant has not shown reversible error.

In the First Yoo Declaration, Yoo declares that the co-inventors conceived of the invention recited in the claims prior to September 18, 2007, the effective filing date of Dussarrat '490. First Yoo Decl. ¶ 4. Yoo further

¹⁰ Declaration under 37 C.F.R. § 1.131 filed April 5, 2016 by inventor Yong Min Yoo.

¹¹ Declaration under 37 C.F.R. § 1.131 filed January 2, 2017 by inventor Yong Min Yoo.

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declares that Exhibit A is a copy of an Invention Disclosure Form dated prior to September 18, 2007 describing PEALD processes that were developed for forming SiO₂ films using the precursor of the claims. First Yoo Decl. ¶ 5.

Exhibit A is entitled an Invention Disclosure Form and includes a description section for describing how to carry out the invention. Exhibit A, § (b). The Exhibit further includes boxed translated portions of section (b) with the following information:

A first box includes the following:

1. Deposition condition:

Temp. 50–350degC

Pressure: 1.5–3 torr

O₂ flow rate: 50–200 sccm

Plasma power: 50–200W

2. Under the condition of 200degC, 3 Torr, O₂ 100 sccm,

Plasma power 50W:

Film growth rate: 1.21 Å/sec

Uniformity: 4%

No incubation cycle

A second box includes the following:

AES analysis

Impurities: carbon and nitrogen less than a few percent

RI: $n=1.459-1.483$

Exhibit A, § (b) (translations).

Yoo declares that the translated portions provide deposition conditions and report results of experiments carried out prior to September 18, 2007. First Yoo Decl. ¶ 6. According to Yoo, these experiments involved depositing silicon oxide by PEALD. *Id.* Yoo further declares that 100 deposition cycles were carried out with a unit cycle time of 1.2 sec./cycle

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and after the 100 cycles, a film of 145 Å was observed, which corresponds to a per cycle deposition rate of 1.45 Å/cycle. First Yoo Decl. ¶ 7.

The Examiner does not dispute that Exhibit A shows that the inventors conceived of a process that achieved a deposition rate of 1.45 Å/cycle before the effective filing date of Dussarrat '490. Ans. 4. Although 1.45 Å/cycle is higher than 1.1 Å/cycle, it is much lower than 2.5 Å/cycle, the upper end point of Appellant's range recited in claim 1.

In the Second Yoo Declaration, Yoo declares that "at the time the experiment was carried out we understood that a deposition rate of at least from 1.1 Å/cycle to 2.5 Å/cycle could be obtained in a PEALD process for depositing silicon oxide films using N,N,N',N'-tetraethyldiaminosilane, the silicon source gas of Claim 1." Second Yoo Decl. ¶ 7.

Appellant contends that the above statement in the Second Yoo Declaration "provides explicit support for the claimed deposition rate" and "itself is clearly sufficient 'demonstrative evidence' of prior conception." Appeal Br. 9. However, Yoo's bare statement is not enough. "[A]n inventor's testimony, standing alone, is insufficient to prove conception—some form of corroboration must be shown." *Price v. Symsek*, 988 F.2d 1187, 1194 (Fed. Cir. 1993). This is because "such facile means of establishing priority of invention would, in many cases, offer great temptation to perjury" as well as have the effect of virtually precluding rebuttal. *Price v. Symsek*, 988 F.2d 1187, 1194 (Fed. Cir. 1993) (quoting *Mergenthaler v. Scudder*, 11 App. D.C. 264, 278 (D.C. Cir. 1897)).

Appellant attempts to distinguish *Mergenthaler* on the basis that the inventors here "had actually practiced the claimed invention and thus had a complete grasp of the means to achieve the claimed deposition rate." Appeal Br. 10. However, the evidence does not support this argument. Figures 3 and

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4 of Exhibit A resemble Figures 2 and 3 of Appellant's Specification. The Specification describes Figures 2 and 3 as illustrating the atomic emission spectroscopy (AES) results and refractive index results for the first embodiment. Spec. ¶¶ 13–14. The close similarity of the figures in Exhibit A to Figures 2 and 3 of the Specification provides some evidence that the method of Exhibit A was conducted according to the first disclosed embodiment of the Specification. Appellant's Specification reports a 2.5 Å/cycle deposition rate, but this deposition rate was achieved using the two directional gas flow of the second embodiment. Spec. ¶ 47 and Table 1. Appellant provides no persuasive basis to conclude that the experiments of Exhibit A were carried out with the two directional flow of the second embodiment. Thus, Appellant has not provided corroborating evidence that shows the inventors had conceived of a PEALD process able to achieve the 2.5 Å/cycle deposition rate of claim 1.

Conception is “the formation, in the mind of the inventor of *a definite and permanent idea of the complete and operative invention, as it is thereafter to be applied in practice.*” *REG Synthetic Fuels, LLC v. Neste Oil Oyj*, 841 F.3d 954, 962 (Fed. Cir. 2016). Here, the evidence tends to show that to be complete and operative for achieving a 2.5 Å/cycle deposition rate the process required the two directional flow described in the second embodiment. Appellant has not provided corroborating evidence that the inventors conceived of the two directional flow process before the effective filing date of Dussarrat '490.

Appellant points out that a “rule of reason” is applied to determine whether the inventor's prior conception testimony has been corroborated and this requires an evaluation of all pertinent evidence to determine the credibility of the inventor's story. Appeal Br. 10–11. We agree a rule of

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reason applies. *See Kolcraft Enterprises, Inc. v. Graco Children's Prod., Inc.*, 927 F.3d 1320, 1324 (Fed. Cir. 2019) (“Whether there is sufficient corroboration is governed by a ‘rule of reason’ analysis, which requires all pertinent evidence to be examined to determine whether the inventor’s testimony is credible.”). We have considered the totality of the evidence on the record in this appeal including the statements in the Yoo Declarations and the Specification. Based on our review, we determine that Appellant has not provided corroboration for Yoo’s statement that “at the time the experiment was carried out we understood that a deposition rate of at least from 1.1 Å/cycle to 2.5 Å/cycle could be obtained.”

The Examiner determines that Exhibit A further lacks a disclosure of the BDEAS flow rate and without this information it cannot be concluded that the species conceived by Appellants is the same as that of Dussrrat ’490. Ans. 4–6 (citing to (Dussarrat ’490 Example 9 at ¶¶ 228–238)). Appellant responds that the “precursor flow rate is not an element of the claims and that the precursor flow rate is not relevant to corroboration of the conception of the deposition rate.” Reply Br. 3. Although Appellant is correct that claim 1 does not explicitly recite the flow rate of the silicon source gas, there is a reasonable basis to believe the flow rate of this reactant would have an effect on the deposition rate given it is a feedstock for the silicon material that is to be deposited. That being said, it appears the Examiner’s purpose was to address the question of whether Appellant has shown conception of as much as what was taught in Dussarrat ’490. *See In re Stempel*, 241 F.2d 755, 759 (C.C.P.A. 1957) (“all the applicant can be required to show is priority with respect to so much of the claimed invention as the reference happens to show.”). Appellant does not argue that its evidence of conception is commensurate in scope with the silicon oxide deposition process taught by

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Dussarrat '490. *See, e.g.*, Reply Br. 3 (“Appellant has not suggested that Exhibit A duplicates a process disclosed in Dussarrat '490”). Thus, we do not consider that question here.

We determine that Appellant has not identified a reversible error in the Examiner's use of Dussarrat '490 in Rejections A–C.

Rejections D–F

The Examiner rejects claims 1, 3–5, 8, 9, 11, 15–18, 29, and 30 under pre-AIA 35 U.S.C. § 103(a) as obvious over Dussarrat '525 in view of Lee and Park. The Examiner adds Mognadam to reject claims 12 and 13. The Examiner further adds Androshuk to reject claim 14.

Two issues arise. The first issue is whether Appellant has identified a reversible error in the Examiner's finding that one of ordinary skill in the art practicing the PEALD process suggested by the combination of prior art would have reasonably expected to deposit a silicon oxide film at a deposition rate in the range of from 1.1 to 2.5 Å/cycle to form a film at a purity where at least one of nitrogen and carbon is present at a concentration of less than 5 atomic %. The second issue is whether Appellant has demonstrated an unexpected result that supports a conclusion of nonobviousness when all the evidence is weighed together.

Appellant has not identified a reversible error in the Examiner's findings with regard to the deposition rate and purity, nor has Appellant provided the necessary evidence of unexpected results.

There is no dispute that Dussarrat '525 teaches a method of depositing a silicon oxide film over a substrate by atomic layer deposition (ALD) where each cycle involves supplying N,N,N',N'-tetraethyldiaminosilane (BDEAS) followed by providing an oxygen-containing gas. Final Act. 12–13; Dussarrat '525 2–4.

The Examiner acknowledges that Dussarrat '525 “does not fairly teach the generation of an oxygen plasma over the substrate in the reactor.” Final Act. 13. The Examiner, however, concludes that it would have been obvious to a person having ordinary skill in the art at the time of the invention to have used oxygen plasma in the ALD process of Dussarrat '525 because Lee provides evidence that “oxygen plasma is known to be suitable for the purpose.” Final Act. 13.

In the Appeal Brief, Appellant does not dispute the Examiner’s finding of a suggestion in the art to apply a plasma to the oxygen-generating gas of Dussarrat '525.¹² Instead, Appellant takes issue with the Examiner’s determination that because the suggested PEALD process uses the same materials (e.g. BDEAS and oxygen/ozone) in the same process steps as the instant invention, the purity and the deposition rate of the instant invention “would also be derived from the process” of the prior art. Final Act. 13. The Examiner further relies on Park as evidence that the use of plasma would have been expected to increase the deposition rate. Final Act. 14.

Appellant contends that the combination does not teach the deposition rate and purity level of claim 1 nor how the ordinary artisan would have “derived” the rate and purity level. Appeal Br. 12–13. Appellant relies on the Declaration of Suvi Haukka dated January 27, 2016 (Haukka Decl.) to support the argument. Appeal Br. 13–15.

¹² We agree with Appellant’s handling of this issue. There can be no real dispute that it was known in the art to supply oxygen or ozone in the form a plasma in the type of ALD process taught by Dussarrat '525. *See, e.g.*, U.S. Patent 6,391,803 B1 to Kim et al., issued May 21, 2002 (disclosing using O₂ or O₃ plasma with an aminosilane silicon source gas (TDMAS) in an ALD process for depositing silicon oxide (col. 3, ll. 16–20; col. 5, ll. 54–56)).

Although the Examiner's language is inartful, we determine that Appellant has not identified a reversible error in the Examiner's determinations as to the purity and deposition rate. The reasons become clear when one considers the teachings of Dussarrat '525, the known use of oxygen plasma in processes such as that of Dussarrat '525, and the Haukka Declaration together.

Dussarrat '525, like Appellant, seeks to form silicon oxide films during the manufacture of semiconductor devices. *Compare* Dussarrat '525 1:8–30, *with* Spec. ¶ 3. Dussarrat '525 teaches an ALD process using an oxygen source and an aminosilane, such as BDEAS, that produces “[h]igh quality films, with very low carbon and hydrogen contents,” which are deposited between 200 and 400°C and 0.1–10 Torr. Dussarrat '525 5:19–6:11. Thus, Dussarrat '525 seeks low carbon content and uses temperatures within Appellant's range and pressures at the same range.

Dussarrat '525 discloses examples that vary the identity of the silicon source gas and perform ALD using an ozone/oxygen mixed gas or ozone alone. Dussarrat '525 Examples 1–7.

The first three examples use trisilylamine (TSA) as the silicon source gas and ozone/oxygen as the oxygen-containing gas. Dussarrat '525 Examples 1–3 at 17:28–19:24. Dussarrat '525 reports a deposition rate of about 1.2–1.7 Å/cycle for these examples. Dussarrat '525 at 19:7–8. Example 5 reports a deposition rate of 0.3 Å/cycle for bis(dimethylamino)silane (BDMAS) and ozone. Dussarrat '525 at 20:28–32. Example 6 reports a deposition rate of 0.2 Å/cycle for tris(dimethylamino)silane (TriDMAS) and ozone. Dussarrat '525 at 21:1–6.

Example 4 uses BDEAS, the silicon source gas of Appellant's claims, and ozone/oxygen as the oxygen-containing gas. Dussarrat '525 at 19:26–

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20–26. Dussarrat '525 states that experiments were performed to determine deposition rate, but Dussarrat '525 does not report the deposition rate.

Dussarrat '525 at 20:13–14. Dussarrat '525 reports that films deposited at 200, 250, 300, 350, and 400°C did not include nitrogen or carbon. Dussarrat '525 at 20:16-18. Thus, Dussarrat '525 discloses a purity within the claimed range, but is silent as to the deposition rate. Moreover, Dussarrat '525 is also silent about energizing the oxygen-containing gas to form a plasma.

Haukka declares that

taking into consideration the cited prior art (including Dussarrat) I would not have expected that a the [sic] recited silicon oxide film deposition process utilizing a silicon source gas comprising N,N,N',N'-tetraethyldiaminosilane and an oxygen plasma generated from an oxygen-containing gas could deposit a high quality silicon oxide film (e.g., with the recited purity) at deposition rates of at least 1.1 Å/cycle.

Haukka Decl. ¶ 9. Haukka bases this opinion on the fact that Dussarrat'525 is silent as to deposition rate in Example 4. Haukka further declares that “[g]iven that deposition rates are disclosed for other Examples in Dussarrat, I would understand the exclusion of a deposition rate from Example 4 of Dussarrat to be intentional, likely because the example could only achieve a very low deposition rate.” *Id.*

We do not find the opinion of Haukka persuasive because it is based on speculation with regard to the intention of Dussarrat '525. We could in turn speculate that Dussarrat '525 omitted the deposition rates for the Example 4 experiments by accident. Either way, speculation is not evidence.

Moreover, Haukka's opinion does not overcome the fact that Dussarrat '525 teaches examples within Example 4 that would have some deposition rate, albeit unreported. Appellant offers no persuasive objective evidence, such as experiments carried out under the conditions Dussarrat

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'525 discloses for Example 4, that reasonably indicates that the deposition rate the ordinary artisan would obtain when following Dussarrat's process would be outside the range of claim 1 or that the result when conducting the process with a plasma was unexpectedly good.

Given that the process of Dussarat '525 must have some deposition rate, generating ozone using plasma was known in the art, and, as pointed out by the Examiner, the materials and process parameters are the same or similar to those disclosed by Appellant, it is reasonable to conclude that those of ordinary skill in the art would have arrived at deposition rate values within the range of the claim when carrying out the suggested process. Appellant has not provided the kind of objective evidence needed to overcome this determination. *See In re Aller*, 220 F.2d 454, 456 (CCPA 1955) (explaining that where the general conditions of a claim are disclosed in the prior art, and the evidence supports a determination that discovery of the optimum or workable ranges would result from routine experimentation, the burden shifts to the applicant to show that the particular range values recited in the claim produce an unexpected result); *In re Mayne*, 104 F.3d 1339, 1343-44 (Fed. Cir. 1997) (noting that an unsupported assertion is insufficient to make a showing that "the claimed invention exhibits some superior property or advantage that a person of ordinary skill in the relevant art would find surprising or unexpected.").

With regard to the purity, Haukka declares that

In my view as an expert in the field of atomic layer deposition, I would not have expected prior to the present invention that a deposition process including a plasma step would necessarily provide films having purity levels similar to or the same as a vapor deposition process without plasma. To the contrary, I would have expected a plasma step to result in a decrease in purity.

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Haukka Decl. ¶ 12. This opinion is not persuasive because, as pointed out by the Examiner, Appellant has not shown that the expected impurity concentration would be outside the purity levels required by claim 1. Ans. 7. Dussarrat '525 is concerned with purity, states that the films have very low carbon contents, and reports that the films of Example 4 have “neither nitrogen nor carbon according to in-depth analysis by Auger.” Dussarrat '525 at 6:9–11 and 20:17–18. Again, it is reasonable to conclude that routine experimentation would have led to purity levels where either nitrogen or carbon is present at less than 5 atomic % in a routinely optimized plasma assisted process. Appellant offers no objective evidence that the result is unexpected.

Considering the opinion of Haukka along with the evidence in Dussarrat '525 and the other prior art, we determine that without a showing of unexpected results *supported by objective evidence*, a preponderance of the evidence supports the Examiner’s conclusion of obviousness.

CONCLUSION

The Examiner’s decision to reject claims 1, 3–5, 8, 9, 11–18, 29, and 30 is affirmed.

DECISION SUMMARY

Claims Rejected	35 U.S.C. §	Reference(s)/Basis	Affirmed	Reversed
1, 3–5, 8, 11–13, 15–18, 29, 30	102(e)	Dussarrat '490, Filmetrics	1, 3–5, 8, 11–13, 15–18, 29, 30	
9	103(a)	Dussarrat '490	9	
14	103(a)	Dussarrat '490, Androshuk	14	
1, 3–5, 8, 9, 11, 15–18, 29, 30	103(a)	Dussarrat '525, Lee, Park	1, 3–5, 8, 9, 11, 15–18, 29, 30	
12, 13	103(a)	Dussarrat '525, Lee, Park, Moghadam	12, 13	
14	103(a)	Dussarrat '525, Lee, Park, Moghadam, Androshuk	14	
Overall Outcome			1, 3–5, 8, 9, 11–18, 29, 30	

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