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Paper 18
Date: April 27, 2020

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

LONGI GREEN ENERGY TECHNOLOGY CO., LTD., LONGI SOLAR TECHNOLOGY CO., LTD., LONGI (H.K.) TRADING LTD., LONGI (KUCHING) SDN. BHD., LONGI SOLAR TECHNOLOGY (TAIZHOU) CO., LTD., LONGI SOLAR TECHNOLOGY (ZHEJIANG) CO., LTD., LONGI SOLAR TECHNOLOGY (HEFEI) CO., LTD., AND LONGI SOLAR TECHNOLOGY (US), INC.,
Petitioner,

v.

HANWHA SOLUTIONS CORPORATION,
Patent Owner.

IPR2020-00047
Patent 9,893,215 B2

Before CHRISTOPHER L. CRUMBLEY, JEFFREY W. ABRAHAM, and JULIA HEANEY, *Administrative Patent Judges.*

HEANEY, *Administrative Patent Judge*.

DECISION
Denying Institution of *Inter Partes* Review
35 U.S.C. § 314

I. INTRODUCTION

LONGi Green Energy Technology Co., LONGi Solar Technology Co., Ltd., LONGi (H.K.) Trading Ltd., LONGi (Kuching) Sdn. Bhd., LONGi Solar Technology (Taizhou) Co., Ltd., LONGi Solar Technology (Zhejiang) Co., Ltd., LONGi Solar Technology (Hefei), Co. Ltd., and LONGi Solar Technology (US), Inc. (collectively "Petitioner") filed a Petition to institute an *inter partes* review of claims 1–11, 15, and 16 of U.S. Patent No. 9,893,215 B2 (Ex. 1001, "the '215 patent"). Paper 1 ("Petition" or "Pet."). Hanwha Q Cells & Advanced Materials Corporation ("Patent Owner") filed a Preliminary Response. Paper 7 ("Prelim. Resp."). In its Preliminary Response, Patent Owner argues the Board should exercise its discretion under 35 U.S.C. § 314(a) to deny institution because institution of a trial would be inefficient and wasteful of resources. Prelim. Resp. 4.

Petitioner requested, and received authorization, to file a pre-institution reply (Paper 11 ("Reply")) to respond to Patent Owner's argument that the Board should exercise its discretion to deny institution under 35 U.S.C. § 314(a). Paper 10, 2. Patent Owner requested, and received authorization, to file a sur-reply (Paper 14 ("Sur-Reply") to respond to Petitioner's argument that the Board should not exercise its discretion to deny institution under 35 U.S.C. § 314(a). Paper 13, 2.

Having considered the foregoing papers and associated evidence, we exercise our discretion under 35 U.S.C § 314(a) and 37 C.F.R. § 42.108(a) to deny institution of an *inter partes* review.

A. Related Proceedings

Petitioner and Patent Owner identify the following pending litigation involving the '215 patent: *Certain Photovoltaic Cells and Products Containing Same*, Inv. No. 337-TA-1151 (U.S.I.T.C.) ("the ITC action");

Hanwha Q CELLS & Advanced Materials Corp. v. JinkoSolar Holding Co. Ltd. et al., No. 1:19-cv-00450-MN (D. Del); *Hanwha Q CELLS & Advanced Materials Corp. v. LONGi Green Energy Technology Co., Ltd. et al.*, No. 1:19-cv-00451-MN (D. Del) ("the district court action"); and *Hanwha Q CELLS & Advanced Materials Corp. v. REC Solar Holdings AS et al.*, No. 1:19-cv-00452-MN (D. Del). Pet. 4; Paper 5, 1. Petitioner and Patent Owner also state the '215 patent is the subject of two other *inter partes* review proceedings: IPR2019-01072 ("the '1072 IPR"); and IPR2019-01145. Pet. 4; Paper 5, 1.

B. The '215 Patent

The '215 patent is titled "Method For Manufacturing a Solar Cell With a Surface-Passivating Dielectric Double Layer, And Corresponding Solar Cell." Ex. 1001, at [54]. According to the '215 patent, "[a] key requirement for achieving high degrees of efficiencies in solar cells is very effective suppression of surface recombination losses." *Id.* at 1:14–16. The '215 patent explains that, in order to achieve this purpose, the surface of solar cells should be passivated as effectively as possible, so that charge carrier pairs which are generated inside the solar cell by incident light and which diffuse to the surfaces of the solar cell substrate do not recombine at the solar cell surface, where they would no longer be available to help improve the efficiency of the solar cell. *Id.* at 1:16–22. Good passivating results can be achieved using aluminum[1] oxide layers which are deposited by means of atomic layer deposition ("ALD"). *Id.* at 2:19–21. However, in ALD, only a single molecular layer of the material to be deposited is

[1] The '215 patent refers to the element as "aluminium." We substitute the American spelling, "aluminum."

generally deposited on the substrate surface within each deposition cycle. *Id.* at 2:23–25. Because a deposition cycle typically lasts about 0.5 to 4 seconds, low deposition rates are generally obtained using ALD, where the thickness of the deposition of the aluminum oxide layers may not be suitable for use as an antireflection layer or as a back reflector. *Id.* at 2:25–32.

The '215 patent describes a method for manufacturing silicon solar cells with a dielectric passivating layer for reducing surface recombination losses in light of the challenges of using an ALD process described above. *Id.* at 2:57–60. The dielectric passivating layer is composed of two partial layers: a first dielectric layer (*i.e.*, very thin aluminium oxide containing layer), which is formed by ALD; and a second dielectric layer (*i.e.*, a thicker layer made of silicon oxide, silicon nitride, or silicon carbide, for example), which can be deposited on the first dielectric layer by means of plasma enhanced chemical vapor deposition ("PECVD"), for example. *Id.* at 2:61–67.

According to one embodiment of the '215 patent, the first dielectric layer is deposited at a thickness of less than 50 nm, preferably less than 30 nm, and more preferably less than 10 nm. *Id.* at 5:40–43. According to the '215 patent, even at a very low thickness, the first dielectric layer offers very good surface-passivating properties on account of its high quality which can be achieved as a result of the ALD. *Id.* at 5:43–45. Further, according to the embodiment, the second dielectric layer is deposited at a thickness of more than 50 nm, preferably more than 100 nm, and more preferably more than 200 nm. *Id.* at 5:51–54. As described in the '215 patent, the thickness of the second dielectric layer can be adapted to its task as an antireflection layer. *Id.* at 5:54–56.

One embodiment of the '215 patent describes a solar cell including silicon wafer 1, and Al_2O_3 layer 3 that is deposited onto the silicon wafer via an ALD coating process. *Id.* at 6:51–7:11, Fig. 1. The solar cell additionally includes silicon oxide thin layer 5 that is subsequently coated onto the Al_2O_3 layer. *Id.* at 7:30–35. The silicon layer, which is deposited by means of PECVD, has a very high hydrogen content and therefore serves as a source of hydrogen. *Id.* at 7:65–8:3. The hydrogen diffuses through the ultrathin Al_2O_3 layer and passivates unsaturated silicon bonds at the Si/Al_2O_3 interface, leading to very good surface passivation. *Id.* at 8:3–7.

C. The Challenged Claims

Petitioner challenges claims 1–11, 15, and 16 of the '215 patent. Pet. 1. Claims 1 and 16 are independent. Claims 2–11 depend from claim 1, and claim 15 depends from claim 12. Claim 1, reproduced below, is illustrative of the subject matter of the challenged claims:

> 1. Method for manufacturing a silicon solar cell, including the following steps:
>
> providing a silicon substrate;
>
> depositing a first dielectric layer having a thickness of less than 50 nm on a surface of the silicon substrate by means of atomic layer deposition, wherein the first dielectric layer comprises alumin[]um oxide; and
>
> depositing a second dielectric layer directly on a surface of the first dielectric layer, materials of the first dielectric layer and the second dielectric layer differing and hydrogen being embedded into the second dielectric layer.

Ex. 1001, 8:14–25.

D. Prior Art and Asserted Grounds of Unpatentability

Petitioner asserts the following grounds of unpatentability:

Claims Challenged	Basis[2]	Reference(s)
1–11, 15, and 16	§ 103	Bhattacharyya[3]
1–11 and 15	§ 103	Bhattacharyya, Hoex 2006[4], Gusev[5], and Duerinckx[6]
10 and 11	§ 103	Bhattacharyya, Hoex 2006, Gusev, Duerinckx, and Schmidt 2001[7]
16	§ 103	Bhattacharyya and Duerinckx

Pet. 23–71. Petitioner relies on the Declaration of Sanjay Banerjee Ph.D. (Ex. 1003).

II. ANALYSIS

A. Procedural Background

Patent Owner filed the ITC action alleging infringement of claims 12–14 of the '215 patent on March 4, 2019, and filed the district court action the following day. Reply 1. The district court action has been stayed. Ex. 3001. The ITC action has been stayed. '1072 IPR, Ex. 1041. Patent

[2] The Leahy-Smith America Invents Act ("AIA") included revisions to 35 U.S.C. §§ 102, 103 that became effective on March 16, 2013. Because the '215 patent issued from an application filed before March 16, 2013, we apply the pre-AIA versions of the statutory bases for unpatentability.
[3] U.S. Patent Application Publication No. 2006/0102972 to Bhattacharyya. (Ex. 1005).
[4] B. Hoex, et al. "Ultralow surface recombination of *c*-Si substrates passivated by plasma-assisted atomic layer deposited Al_2O_3," Applied Physics Letters 89, 042112 (2006) (Ex. 1007).
[5] E. P. Gusev, et al. "High-resolution depth profile in ultrathin Al_2O_3 films on Si," Applied Physics Letters 76, 176 (2000) (Ex. 1052).
[6] F. Duerinckx, et al. "Defect passivation of industrial multicrystalline solar cells based on PECVD silicon nitride," Solar Energy Material & Solar Cells 72, 231 (2002) (Ex. 1008).
[7] J. Schmidt, et al. "Surface passivation of silicon solar cells using plasma-enhanced chemical-vapour-deposited SiN films and thin thermal SiO_2/plasma SiN stacks," Semicond. Sci. Technol. 16, 164 (2001) (Ex. 1054).

Owner has not alleged infringement of claims 1–11, 15, and 16 in the ITC action.

Petitioner filed the '1072 IPR challenging claims 12–14 of the '215 patent on May 13, 2019, and Patent Owner filed its Preliminary Response in the '1072 IPR on September 5, 2019. Petitioner filed the present petition on October 22, 2019. We instituted trial in the '1072 IPR on December 4, 2019.

B. Discretionary Denial of Institution Under 35 U.S.C. § 314(a)

The Board decides whether to institute an *inter partes* review pursuant to a delegation of authority from the Director. *See* 37 C.F.R. § 42.4(a). The Board may not institute an *inter partes* review unless "the information presented in the petition . . . and any response . . . shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition." 35 U.S.C. § 314(a). But even if a petition meets this standard, the Board retains discretion to deny institution of an *inter partes* review. *See* 35 U.S.C. § 314(a) (stating "[t]he Director *may not* authorize an inter partes review to be instituted unless the Director determines that the information presented in the petition . . . shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition" (emphasis added)); 37 C.F.R. § 42.108(a) (stating "the Board *may* authorize the review to proceed on all or some of the challenged claims and on all or some of the grounds of unpatentability asserted for each claim" (emphasis added)).

The Board's precedential decision in *General Plastic Co. v. Canon Kabushiki Kaisha*, IPR2016-01357, Paper 19 (PTAB Sept. 6, 2017) sets forth seven non-exhaustive factors that we consider in determining whether

to permit a petitioner to move forward with multiple petitions that challenge the same patent:

> 1. whether the same petitioner previously filed a petition directed to the same claims of the same patent;
>
> 2. whether at the time of filing of the first petition the petitioner knew of the prior art asserted in the second petition or should have known of it;
>
> 3. whether at the time of filing of the second petition the petitioner already received the patent owner's preliminary response to the first petition or received the Board's decision on whether to institute review in the first petition;
>
> 4. the length of time that elapsed between the time the petitioner learned of the prior art asserted in the second petition and the filing of the second petition;
>
> 5. whether the petitioner provides adequate explanation for the time elapsed between the filings of multiple petitions directed to the same claims of the same patent;
>
> 6. the finite resources of the Board; and
>
> 7. the requirement under 35 U.S.C. § 316(a)(11) to issue a final determination not later than 1 year after the date on which the Director notices institution of review.

Id. at 15–16. We consider these factors below.

1. *Factor 1: whether the same petitioner previously filed a petition directed to the same claims of the same patent*

In the '1072 IPR, Petitioner challenged claims 12–14 of the '215 patent; the present Petition challenges claims 1–11, 15, and 16. Although there is overlap in the claimed subject matter involved in each case, Petitioner does not challenge in the present Petition any previously challenged claim. Because the present Petition is directed to different claims than the '1072 IPR, this factor weighs against invoking our discretion to deny institution.

2. Factor 2: whether at the time of filing of the first petition the petitioner knew of the prior art asserted in the second petition or should have known of it

Several of the references asserted in the present Petition are also asserted in the '1072 IPR. In particular, Petitioner relies on Bhattacharyya, Hoex 2006, and Duerinckx in both petitions. Prelim. Resp. 8. Schmidt 2001, a reference only asserted in the present Petition, is identified in the '215 file history. *Id.* (citing Ex. 1002, 740–745). Accordingly, Petitioner either knew or should have known of Schmidt 2001 as of the filing date of the petition in the '1072 IPR.

Petitioner and other respondents in the ITC action identified Gusev, the other reference asserted only in the present Petition, in a notice of prior art dated June 14, 2019, in the ITC action. *Id* (citing Ex. 2003 1, 3, Ex. A). Although this is after the May 2019 filing date of the petition in the '1072 IPR, Gusev is an article published in a well-known[8] journal in 2000, and Petitioner acknowledges it addresses ALD in "the related field of silicon semiconductor devices." Pet. 61. Petitioner also acknowledges that ALD was well-known as of 2006. Pet. 72. This suggests Petitioner should have known of Gusev as of the May 2019 filing date of the '1072 IPR petition.

Other than stating that Gusev is one of many references "discovered over a range of time between May 12 and August 23," Petitioner does not address this factor specifically in relation to references asserted in the present Petition. We address, under Factors 4 and 5 below, Petitioner's assertion as to background references discovered between May 12 and August 23.

[8] Gusev and Hoex 2006, which Petitioner relies upon in both petitions, were published in the Applied Physics Letters.

Accordingly, this factor weighs in favor of invoking our discretion to deny institution.

3. Factor 3: whether at the time of filing of the second petition the petitioner already received the patent owner's preliminary response to the first petition or received the Board's decision on whether to institute review in the first petition

As discussed above, Petitioner received Patent Owner's Preliminary Response in the '1072 IPR around six weeks before it filed the present Petition, and received the Board's decision to institute in the '1072 IPR afterward. Patent Owner argues that in the present Petition, Petitioner attempts "to address deficiencies identified by Patent Owner in the ['1072] petition." Prelim. Resp. 9 (citing Pet. 72 n.6; Ex. 2002 34–35). Petitioner does not dispute this; nonetheless, based on this single instance identified by Patent Owner, we do not perceive improper gamesmanship by Petitioner. Further, Petitioner did not have the benefit of our institution decision in the '1072 IPR when it filed the present Petition. In consideration of the foregoing facts concerning the timing of the Petition, this factor is neutral.

4. Factors 4 and 5: the length of time that elapsed between the time the petitioner learned of the prior art asserted in the second petition and the filing of the second petition; and whether the petitioner provides adequate explanation for the time elapsed between the filings of multiple petitions directed to the same claims of the same patent

As discussed above, Patent Owner asserts that Schmidt 2001 is identified in the '215 file history, and that Petitioner was aware of Gusev at least as of June 14, 2019. Petitioner does not dispute this, but argues that the four-month delay in filing the present Petition was necessitated by "substantial additional analysis to make the case for unpatentability" because of the limitations relating to ALD in claims 1 and 15, and that "numerous

other limitations in the dependent claims also required additional analysis." Reply 4–5. Petitioner further argues that Schmidt 2001 and Gusev "are only two of the more than 20 additional new references cited as background and evidence that the additional limitations of the newly challenged claims would have been obvious" and asserts that it discovered the background references between May 12 and August 23. *Id*. at 5.

Petitioner's arguments do not persuade us that the four-month delay was justified. The Petition asserts "there is no question that ALD and PECVD methods were well-known by 2006" and relies on the new background references as evidence that Bhattacharyya is enabled. Pet. 72; *see id*. at 71–76. This suggests that Petitioner should have known of the prior art references at the time of filing the '1072 IPR (Factor 2, *supra*), and would not have needed an additional four to five months to analyze the references and prepare the Petition.

We note that *General Plastic's* fifth factor is directed to the time between "multiple petitions directed to the same claims of the same patent," and the present Petition challenges different claims of the same patent as the '1072 IPR. Patent Owner asserts, however, that Petitioner "block-copied entire portions of analysis from the prior petition" and that the claim limitation "hydrogen being embedded [in/into] the second dielectric layer" appears in all of the challenged claims in both petitions, and "first dielectric layer [having] a thickness of less than 50 nm" appears in all of the challenged claims except for claim 16. Prelim. Resp. 7–8. Petitioner does not dispute this. This overlap in the claim limitations and duplication of analysis from the '1072 IPR petition suggests that it should have taken Petitioner less time to prepare the present Petition than it otherwise would have if Petitioner had needed to analyze entirely different claims and

references in the present Petition. Accordingly, these factors weigh slightly in favor of invoking our discretion to deny institution.

5. *Factors 6 and 7: the finite resources of the Board; and the requirement under 35 U.S.C. § 316(a)(11) to issue a final determination not later than 1 year after the date on which the Director notices institution of review*

In view of the substantial overlap between the prior art references and claim limitations in the '1072 IPR and the present Petition, the most efficient way to manage the two *inter partes* reviews would be to coordinate or consolidate the proceedings and adopt a common schedule. This might have been possible had Petitioner filed the present Petition at the same time, or shortly after, the '1072 IPR. But because of Petitioner's five-month delay, it would be difficult, if not impossible, for the Board to adjust due dates in the '1072 IPR enough to coordinate with the present proceeding, and still meet the statutory mandate to issue a final written decision in the '1072 IPR by December 4, 2020.[9] Thus, instituting a second *inter partes* review would require us to conduct an entirely separate proceeding involving numerous issues that likely will already have been considered and resolved in the '1072 IPR. Our task would be complicated by the fact that the proceedings would have different evidentiary records. Moving forward with separate proceedings involving overlapping issues, but having different evidentiary records and schedules, would have a significant impact on the Board's resources. Accordingly, these factors weigh in favor of invoking our discretion to deny institution.

[9] Because the'1072 IPR was instituted on December 4, 2019, the deadline under 35 U.S.C. § 316(a)(11) for the Board to issue a final written decision is December 4, 2020.

6. Other Considerations

As noted above, the *General Plastic* factors are non-exhaustive, and other considerations may be relevant to the question of whether the Board should decline to institute trial. That is particularly the case here, where the facts do not align completely with the fact pattern of *General Plastic*, which addressed a second, so-called "follow-on" petition challenging the same claims of the same patent. Here, by contrast, the Petitioner challenges different claims in the second Petition, making the present Petition less a "follow-on" and instead more similar to those cases in which a petitioner files multiple petitions challenging the same patent at the same time. The Board's Consolidated Trial Practice Guide[10] ("Consolidated TPG") provides the following guidance regarding the practice of filing multiple petitions that challenge a single patent:

> Based on the Board's experience, one petition should be sufficient to challenge the claims of a patent in most situations. Two or more petitions filed against the same patent at or about the same time (e.g., before the first preliminary response by the patent owner) may place a substantial and unnecessary burden on the Board and the patent owner and could raise fairness, timing, and efficiency concerns. . . .
>
> Nonetheless, the Board recognizes that there may be circumstances in which more than one petition may be necessary, including, for example, when the patent owner has asserted a large number of claims in litigation or when there is a dispute about priority date requiring arguments under multiple prior art references. In such cases two petitions by a petitioner may be needed, although this should be rare.

Consolidated TPG, 59.

[10] Available at https://www.uspto.gov/TrialPracticeGuideConsolidated.

Petitioner argues that it could not have addressed all claims of the '215 patent in a single petition, because of substantive differences between the claims. Reply 3 (citing *Microsoft Corp. v. IPA Techs., Inc.*, IPR2019-00814, Paper 12 at 18–19 (PTAB November 6, 2019)). The '215 patent is markedly different from the patent challenged in *Microsoft*, where Patent Owner asserted infringement of 75 of the 89 claims in the patent. *Microsoft*, Paper 12 at 11–12. Here, Petitioner has not persuasively explained why all of its challenges to the sixteen claims of the '215 patent could not have been raised in the '1072 IPR petition, especially considering the common subject matter in the claims challenged in the separate petitions. Alternatively, even if Petitioner required two petitions to challenge the sixteen claims of the '215 patent, Petitioner does not explain why it did not file those two petitions on or around the same time.

Petitioner also states that it filed the present Petition because it "did not receive any assurance" that Patent Owner[11] would not assert infringement of claims 1–11, 15, and 16 after the ITC indicated it would grant summary judgment of noninfringement of claims 12–14, and Petitioner was facing the upcoming one-year time bar for filing a petition with respect to all claims. Reply 4. Despite the one-year time bar and a theoretical potential need for Petitioner to challenge additional claims of the '215 patent should they be asserted in the parallel proceedings, Petitioner's delay in filing the present Petition in combination with Petitioner's failure to provide

[11] Patent Owner argued that "[t]he newly challenged claims in this petition have not been asserted against Petitioner, and it would be wasteful of the Board's resources to institute an IPR in connection with this petition." Prelim. Resp. 10. Presumably, Patent Owner would not make this argument if it plans to amend its contentions to add any of these challenged claims to the parallel proceedings.

a sufficient explanation for the delay and the difficulties this delay would create in consolidation of the petitions, weighs against institution. Accordingly, Petitioner's argument, in addition to all of the foregoing factors, does not persuade us not to exercise our discretion to deny institution.

III. CONCLUSION

For the foregoing reasons, we exercise our discretion and deny institution of *inter partes* review under 35 U.S.C. § 314(a) and 37 C.F.R. § 42.108(a).

IV. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that the Petition is denied, and no *inter partes* review is instituted.

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