

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

LG ENERGY SOLUTION, LTD.,
SAMSUNG ELECTRONICS CO., LTD., and
SAMSUNG ELECTRONICS AMERICA, INC.,
Petitioner,

v.

MOLECULAR REBAR DESIGN, LLC,
Patent Owner.

IPR2024-01011¹
Patent 8,968,924 B2

Before GRACE KARAFFA OBERMANN, KRISTINA M. KALAN, and
AVELYN M. ROSS, *Administrative Patent Judges*.

OBERMANN, *Administrative Patent Judge*.

DECISION
Denying Petitioner's Request for Rehearing
37 C.F.R. § 42.71(d)

¹ Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc. were joined as parties via a Motion for Joinder in IPR2025-00357.

I. INTRODUCTION

Petitioner filed a Request for Rehearing (Paper 42, “Request” or “Reh. Req.”) of our Final Written Decision (Paper 38, “Decision” or “Dec.”) in which we determined that Petitioner did not demonstrate that claims 1–5 of U.S. Patent No. 8,968,924 B2 (Ex. 1001, “the ’924 patent”) are unpatentable. With our authorization, Patent Owner filed a Response to the Request (Paper 45, “Reh. Resp.”), and Petitioner filed a Reply to Patent Owner’s Response to the Request (Paper 46, “Reh. Reply.”). We *deny* the Request for the following reasons.

II. STANDARD OF REVIEW

The standard applicable to a request for rehearing of a Board decision is provided in Rule 42.71(d), which states in pertinent part:

The burden of showing a decision should be modified lies with the party challenging the decision. The request must specifically identify all matters the party believes the Board misapprehended or overlooked, and the place where each matter was previously addressed in a motion, an opposition, a reply, or a sur-reply.

37 C.F.R. § 42.71(d). A request for rehearing is not an opportunity to present new arguments or evidence or merely to disagree with the panel’s assessment of the arguments or weighing of the evidence.

III. ANALYSIS

In Petitioner’s view, the Board erred in its analysis of the Ohata-Kavan combination by “wrongly conclud[ing] that Ohata achieves electrical conductivity ‘by a materially different mechanism’—namely through the

phenomenon of ‘electron tunneling’ and ‘percolation threshold’—despite an acknowledged lack of ‘physical contact between the oxidized surfaces of nanotubes and an electrode active material.’” Reh. Req. 1 (citing Dec. 21–23). Petitioner argues that “[t]he record evidence makes clear that a battery electrode, such as those found in Ohata, operates through physical contact that is made between the conductive additive (e.g., carbon nanotubes) and the ion active materials.” *Id.* at 3.

In addition, Petitioner contends the Board erred by misapprehending the Cheng-Gan combination, specifically, by “assum[ing] that the **starting** material for the Cheng-Gan combination includes nanotubes having an oxidation level based on Gan.” Reh. Req. 2. Moreover, Petitioner contends “the Board compounded its error by overlooking Petitioner’s responsive evidence (*see, e.g.*, Pet. Reply, 18-22) demonstrating that the Cheng-Gan nanotubes would retain their oxidative functionalities.” *Id.* at 3.

Patent Owner disputes each of Petitioner’s contentions. As to the Ohata-Kavan combination, Patent Owner asserts that the Board properly determined that the carbon nanotubes in Ohata’s masterbatch binder remain fully coated with resin (PVDF), even after it is blended with a dispersion medium (NMP), such that the carbon nanotubes do not make physical contact with electrode active material. *See* Reh. Resp. 1–4. Patent Owner also asserts that the Board properly determined that the binder is electrically conductive such that physical contact does not need to occur in Ohata. *See id.* at 4–8. With respect to the Cheng-Gan combination, Patent Owner asserts that Petitioner presents a new theory in the Request that “was never raised in

the Petition/Reply,” and, in any case, Petitioner’s “new theory fails.” Reh. Resp. 9–10.

Based on the information presented by the parties, we are not persuaded that we misapprehended or overlooked any matters in the Final Written Decision. Accordingly, we decline to modify the Final Written Decision for the reasons explained by Patent Owner, which we adopt as our own. *See* Reh. Resp. 1–10. We provide the following discussion for emphasis only.

A. The Ohata-Kavan Combination

In the Final Written Decision, we observed that the claimed feature in which the “discrete carbon nanotubes” have “ion active material attached to their surface” (claim limitation [1b]) was critical to our determination that no claims are unpatentable under the Ohata-Kavan ground. *See* Dec. 19.

In particular, we were not persuaded by Petitioner’s arguments or evidence that Ohata’s carbon nanotubes, after being “added to the resin of Ohata’s masterbatch binder,” would “become available for attachment (and, in fact, become attached) to an added electrode active material.” *Id.* (citing Pet. 12–13). Instead, we determined “the ‘masterbatch’ process of Ohata[] involves embedding (that is, fully coating) carbon nanotubes in a resin . . . which, critically for our purposes, prevents the nanotube surfaces from being exposed and available for attachment to the electrode active material.” *Id.* (citing Ex. 2006 ¶ 98).

That determination is supported by the preponderance of the evidence, which strongly favors Patent Owner’s position that the surfaces of the Ohata-Kavan nanotubes are unavailable for attachment. *See, e.g.,* Dec. 20

n.11 (citing Ex. 2006 ¶¶ 99–126) (“Dr. Chung cogently explains, with exceptional clarity, why the carbon nanotube[] surfaces, embedded within PVDF resin in the proposed Ohata-Kavan composition, are **unavailable** for attachment to the electrode active material . . .”).

Nothing in Petitioner’s Request is persuasive to show that the preponderance of the evidence does **not** support that crucial factual finding. The position Petitioner presents in the Rehearing—namely, that there must, in fact, be physical contact between the nanotubes and active material in order for Ohata to function as intended (*see* Reh. Req. 3)—was fully considered in view of the totality of the evidence of record (*see* Dec. 22 (“Petitioner posits that . . . there **must** be direct physical contact between the nanotube surfaces and the active material. Reply Br. 5–6.^[2] That is false.”)).

In particular, we were unpersuaded in the Final Written Decision by Petitioner’s assertion that Ohata’s blending of a dispersion medium (NMP) into a mixture of the masterbatch binder and electrode active material necessarily dissolves the resin sufficiently so as to make the nanotubes available for attachment. *See* Dec. 23–26. Although Petitioner argues we overlooked this aspect of Ohata’s process (*see* Reh. Req. 4, 10–12; Reh. Reply 4–5), all the evidence of record on this point was fully considered (*see* Dec. 26 (“Patent Owner advances evidence that PVDF would bond to the oxidized carbon nanotube surfaces in the proposed Ohata-Kavan composition, and Petitioner raises insufficiently persuasive evidence that the addition of NMP as a dispersion medium would break that bond.”)).

² The citation is to Petitioner’s Reply to the Preliminary Response (Paper 6).

Significantly, there is no genuine dispute that in the Ohata-Kavan combination, the nanotubes are immersed in relatively substantial amounts of resin (namely, nanotubes mixed with “80% PVDF resin (at minimum).” Dec. 22 (citing Ex. 1004 ¶ 6). In light of that significant circumstance, the hurdle was relatively high for Petitioner to discharge its burden of proving that the nanotubes are not coated with resin and, therefore, are available for attachment to the electrode active material in the proposed combination. *See id.* (citing Tr. 32:13–23) (“Petitioner’s counsel effectively admitted that this ground fails if the discrete carbon nanotubes in the proposed Ohata-Kavan composition are fully coated in resin.”).

To be clear, that burden of proving that the nanotubes are not coated with resin fell squarely on Petitioner during the trial, but Petitioner’s evidence on point was sparse and was overwhelmed by Patent Owner’s countervailing proof. *See* Dec. 20–26 (detailed weighing of the evidence on point). Rehearing is not an opportunity to express disagreement with our weighing of the evidence.

Petitioner also presents a review of the evidence that allegedly contradicts the theories of electron tunneling and percolation threshold, arguing that the Board reversibly erred by accepting “the notion that Ohata somehow works in a materially different manner without physical contact between the nanotube surface and the active materials.” Reh. Req. 10; *see id.* at 6–10; Reh. Reply 1–4. But Petitioner acknowledges that we considered and rejected this position. *See* Reh. Req. 8 (noting “the Board stated that ‘Petitioner’s arguments ... fail to account adequately ... for the phenomena of electron tunneling and percolation threshold that undergird Ohata’s

mechanism’”) (citing Dec. 21–23). Again, rehearing is not an opportunity to disagree with the panel’s assessment of the arguments or weighing of the evidence.

In Petitioner’s further view, Patent Owner’s argument that Ohata achieves electrical conductivity without physical contact between carbon nanotubes and active material as “an eleventh-hour, attorney-driven pivot—raised for the first time in Patent Owner’s Sur-Reply.” Reh. Req. 2. But Petitioner raised the issue of whether physical contact is required in Ohata in the Reply (*see, e.g.*, Pet. Reply 6 (asserting that “without contact between the conductive additive (*e.g.*, nanotubes) and the active material, the electrode material would be inoperable in a battery”)), and, thus, Patent Owner properly responded by presenting evidence and argument to the contrary, by showing that electrical conductivity does not require physical contact (*see, e.g.*, PO Sur-reply 16 (“**Physical** contact is not required for there to be electrical contact. Petitioner’s theory disregards the scientific principles of ‘electron tunneling’ and ‘the percolation threshold’”))).

We disagree with Petitioner that, in weighing the evidence on this point, the Board in the Final Written Decision “erroneously required Petitioner to essentially prove that Ohata’s masterbatch process ‘necessarily results in attachment between the nanotube surfaces and the active material.’” Reh. Req. 2 (citing Dec. 23). This was the position Petitioner adopted (Pet. Reply 7 (asserting that “an electrode material without contact between nanotubes and active material would be non-functional”); Dec. 24 (“Petitioner’s arguments, in that regard, amount to an unproven inherency

theory of obviousness.”)), and, thus, Petitioner bore the burden of proving its position, which it failed to bear.

Patent Owner’s extensive and detailed counterarguments as to Petitioner’s identification of alleged reversible errors in the Board’s treatment of the Ohata-Kavan combination are persuasive, and we adopt Patent Owner’s reasoning as our own. Reh. Resp. 1–8.

B. The Cheng-Gan Combination

In the Final Written Decision, the Board explained the shortcomings of Petitioner’s challenge involving the Cheng-Gan combination, which is “based on using Gan’s functionalized nanotubes as a starting material in Cheng’s process, by making a first-step ultrasonic dispersion, then subjecting that dispersion to Cheng’s ‘further mixing and process steps’ to obtain the ‘composite cathode material’ reported in Cheng.” Dec. 28 (citing Pet. 37, 42; Ex. 1007 ¶ 19). As explained, we were not persuaded that Gan’s nanotubes selected by Petitioner, which are “functionalized to levels ‘from about 2.5 to about 10wt%’—a range encompassed by claim [1d],” “would retain the same level of oxidation after enduring Cheng’s subsequent calcining step.” *Id.* at 29 (citing Pet. 36–70).

In particular, and in addition to concerns about impermissible hindsight reconstruction, we determined that “Patent Owner’s evidence casts significant doubt on whether Gan’s functionalized carbon nanotubes would have emerged from Cheng’s calcining step without removal of the functional groups.” *Id.* at 30 (citing PO Resp. 62–66); *see id.* at 32 (“[W]e determine that the Petition is deficient for failure to discuss the impact of Cheng’s

calcining process on the oxidation levels of the carbon nanotubes that end up in the final Chen-Gan composition.”).

We disagree with Petitioner that we misapprehended the Cheng-Gan combination presented in the Petition as using Gan’s functionalized nanotubes as starting material for Cheng’s process. As pointed out by Patent Owner, the challenge, as articulated in the Petition, proposes either functionalizing carbon nanotubes or obtaining functionalized carbon nanotubes from commercial sources, as described by Gan, and “*applying such functionalized [CNTs] in* preparing the composite described in Cheng.” Reh. Resp. 8 (citing Pet. 41–42, 50).

Petitioner belatedly argues “that the specific oxidation level taught by Gan applies to the final composition of the Cheng-Gan combination (not the starting material), which would be achieved using starting material having any suitable oxidation level,” because this was not presented in the Petition and changes the thrust of the challenge. Reh. Req. 3. As explained above, a request for rehearing is not an opportunity to present new arguments. Accordingly, we decline to consider this new argument.

Alternatively, even when we consider this new argument, we find the challenge is deficient for the three reasons cogently explained by Patent Owner. First, Patent Owner alleges that Petitioner “never advanced arguments or evidence as to the starting ox-level needed”; second, “Gan *expressly teaches away* from oxidizing above 10% because it damages the CNTs”; and third, “the Board rejected similar unsubstantiated/conclusory obviousness arguments ‘[g]iven the unpredictable nature of chemical reactions.’” Reh. Resp. 10.

Further, to the extent Petitioner asserts that the theory set forth in the Request does not require a higher starting oxidation level of carbon nanotubes in order to result in Gan’s described oxidation range of 2.5–10%, despite being subjected to Cheng’s calcining process (*see, e.g.,* Reh. Req. 14–15 (“Petitioner’s Reply presented evidence, supported by expert testimony, demonstrating that oxidized carbon nanotubes retain their functional groups following calcination in an inert atmosphere”)); *see also* Reh. Reply 7), that assertion falls short of establishing that we misapprehended or overlooked anything on this issue in the Final Written Decision.

Specifically, this theory does not overcome Patent Owner’s compelling evidence, raised in the trial-phase Response, establishing “that the calcining step of Cheng-Gan would bring the oxidation levels” of the nanotubes “below the claimed range;” evidence that was credited in the Final Written Decision, and evidence that Petitioner’s failed to counter in the Reply. Reh. Resp. 9 (citing Paper 17, 62–66). As Patent Owner persuasively points out, this theory fails “*to account for the calcining step*” and, importantly, lacks evidentiary support sufficient to outweigh Patent Owner’s compelling evidence that an ordinarily skilled artisan would have needed “to start with significantly higher oxidation levels so that the final ox-levels would fall within the 2.5–10% range *after calcination.*” Reh. Resp. 10 (Patent Owner emphasis).

In sum, Patent Owner’s counterarguments are persuasive, and we adopt Patent Owner’s reasoning as our own. *See* Reh. Resp. 8–10.

IV. CONCLUSION

For the above reasons, Petitioner has not carried its burden of demonstrating that the Board misapprehended or overlooked any matters in rendering the Final Written Decision. *See* 37 C.F.R. § 42.71(d). Because Petitioner's challenge does not meet the standard set forth for a request for rehearing, Petitioner's Request is *denied*.

V. ORDER

It is

ORDERED that Petitioner's Request is *denied*.

IPR2024-01011
Patent 8,968,924 B2

PETITIONER:

W. Karl Renner
Timothy Riffe
Hyun Jin In
Gretchen DeVries
FISH & RICHARDSON P.C.
axf-ptab@fr.com
riffe@fr.com
in@fr.com
devries@fr.com

PETITIONER IPR2025-00357 (joined)

Andrew Sommer
Heath Briggs
Julie Bookbinder
Trenton Ward
Kathryn Albanese
GREENBERG TRAURIG, LLP
sommera@gtlaw.com
briggsh@gtlaw.com
bookbinderj@gtlaw.com
trenton.ward@gtlaw.com
albanesek@gtlaw.com

PATENT OWNER:

Stephen Zinda
James Hall
CABELLO HALL ZINDA, PLLC
stephen@chzfirms.com
james@chzfirms.com