

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

DAIKIN INDUSTRIES, LTD. and DAIKIN AMERICA, INC.,
Petitioner,

v.

THE CHEMOURS COMPANY FC, LLC
Patent Owner.

Case IPR2018-00993
Patent 8,076,431 B2

Before JO-ANNE M. KOKOSKI, KRISTINA M. KALAN, and
SHELDON M. McGEE, *Administrative Patent Judges*.

McGEE, *Administrative Patent Judge*.

DECISION
Institution of *Inter Partes* Review
35 U.S.C. §314(a)

I. INTRODUCTION

A. *Background*

Daikin Industries Ltd. and Daikin America, Inc. (collectively, “Petitioner”) filed a Petition requesting an *inter partes* review of claims 1–7 of U.S. Patent No. 8,076,431 (Ex. 1001, “the ’431 patent”). Paper 1 (“Pet.”). The Chemours Company FC, LLC (“Patent Owner”) filed a Preliminary Response to the Petition. Paper 7 (“Prelim. Resp.”).

Along with its Preliminary Response, Patent Owner filed a Statutory Disclaimer of claims 1, 2, and 5–7 of the ’431 patent. Prelim. Resp. 1; Ex. 2005. As a result of Patent Owner’s Statutory Disclaimer of some, but not all, of the challenged claims, Petitioner sought authorization to file a reply to address the legal effect of Patent Owner’s disclaimer. On September 5, 2018, a telephone conference was held among respective counsel for Petitioner, Patent Owner, and Judges Kokoski, Kalan, and McGee to determine whether good cause exists for Petitioner to file a reply to Patent Owner’s Preliminary Response. A transcript of the telephone call was filed by Petitioner. Paper 9; Ex. 1037. We determined that Petitioner had demonstrated good cause to file a reply, and authorized limited briefing from both parties on the potential legal effect of Patent Owner’s disclaimer of some, but not all, claims of the ’431 patent. Paper 8. Petitioner timely filed a reply (Paper 10, “Pet. Reply”), to which Patent Owner filed a sur-reply (Paper 11, “PO Sur-Reply”).

B. *Legal Effect of Patent Owner’s Statutory Disclaimer*

We begin by addressing the legal effect of Patent Owner’s Statutory Disclaimer of claims 1, 2, and 5–7 of the ’431 patent. Ex. 2005.

In its Reply to Patent Owner’s Preliminary Response, Petitioner asserts Patent Owner likely chose to statutorily disclaim some, but not all, claims of the ’431 patent because doing so would, according to Petitioner, “improve its odds against the backdrop of *SAS Institute Inc. v. Iancu* . . . — *i.e.*, institution for *any* challenged claim requires institution for *every* challenged claim — of avoiding institution by disclaiming most of its claims and leaving only dependent claim 3 and 4.” Pet. Reply 1. Thus, Petitioner asks the Board to enter adverse judgment against the disclaimed claims and “estop [Patent Owner] under 37 C.F.R. § 42.73(d) from contradicting its disclaimer and taking actions inconsistent with the adverse judgment,” namely, defending the patentability of remaining claims 3 and 4. *Id.* at 1–2.

In support of its desired relief, Petitioner cites to *Smith & Nephew, Inc. v. Arthrex, Inc.*, Case IPR2016-00917, slip op. at 8–9 (PTAB Sept. 21, 2016) (Paper 12), *aff’d sub nom*, 880 F.3d 1345 (Fed. Cir. 2018), and avers the Board has power to construe Patent Owner’s Statutory Disclaimer as a request for adverse judgment under Rule 42.73(b). Pet. Reply 2. Petitioner states that the Board exercised such power in the *Smith & Nephew* case “to preclude the patent owner from arguing for the patentability of claims patentably indistinct from those disclaimed.” *Id.* Petitioner reasons that similar circumstances exist in the present case because claims 3 and 4 are, according to Petitioner, patentably indistinct from claim 1, from which they depend. *Id.* Petitioner asserts that allowing Patent Owner to rely on limitations appearing in a disclaimed claim (*i.e.*, claim 1) to defend patentably indistinct dependent claims (*i.e.*, claims 3 and 4) “frustrates the Board’s articulated policies of finality and repose.” *Id.* Petitioner further points to Rule 42.73(b) which sets forth actions that may be construed as a

request for adverse judgment. *Id.* at 3. Petitioner then avers that such examples are non-exhaustive and, thus, do not preclude the rule's application to the current facts. *Id.*

In its Sur-Reply, Patent Owner disagrees that its statutory disclaimer of some, but not all, claims challenged in the Petition should be construed by the Board as a request for adverse judgment on the disclaimed claims. PO Sur-Reply 1–4. Rather, Patent Owner argues that, under Rule 42.73(a), a “judgment” “disposes of all issues that were . . . raised and decided,” and that because claims 3 and 4 remain in the trial, undecided issues likewise remain, and “any type of judgment, much less adverse judgment, is thus inappropriate.” *Id.* at 1–2.

Patent Owner also points to Rule 42.107(e), which specifically allows for disclaimer of one or more claims prior to a decision on institution, and provides that “[n]o *inter partes* review will be instituted based on disclaimed claims.” PO Sur-Reply 3. Patent Owner also contends that the Board's Trial Practice Guide is consistent with the aforementioned Rule because it allows Patent Owner “to streamline the proceedings” by disclaiming one or more claims. *Id.* Patent Owner contends that the Trial Practice Guide “further differentiates between the situations where no challenged claims remain and where one or more challenged claims remain,” but, using Petitioner's logic, there would be no difference between these situations. *Id.*

Patent Owner also argues that, because adverse judgment is not appropriate under the instant facts, estoppel should not apply to its arguments against the remaining claims in the trial, i.e., claims 3 and 4. PO Sur-Reply 4. According to Patent Owner, dependent claims 3 and 4 are patentably distinct from disclaimed independent claim 1, and, as such, it is

proper to rely on limitations appearing in disclaimed claim 1 because they are present in dependent claims 3 and 4 themselves. *Id.* at 4–5.

We agree with Patent Owner and decline to enter an adverse judgment against disclaimed claims 1, 2, and 5–7. By extension, no estoppel attaches to Patent Owner’s arguments made as to remaining claims 3 and 4. Our reasoning follows.

First, Rule 42.107(e) specifically contemplates the current situation. Namely, a patent owner, in a preliminary response, “may file a statutory disclaimer under 35 U.S.C. § 253(a) . . . disclaiming one or more claims in the patent.” 37 C.F.R. § 42.107(e). Under such circumstances, the rule is clear— “[n]o *inter partes* review will be instituted based on disclaimed claims”—and is notably silent as to the adverse judgment and estoppel Petitioner seeks.

Second, as noted by Patent Owner (PO Sur-Reply 1–2), Rule 42.73 indicates that a “judgment” is a disposition “of *all* issues that were, or by motion reasonably could have been, *raised and decided.*” 37 C.F.R. § 42.73(a) (emphasis added); *see also* 37 C.F.R. § 42.2 (defining “judgment” as “a final written decision by the Board, or a termination of the proceeding”). Here, Petitioner challenges claims 1–7 of the ’431 patent. Pet. 14. Although Patent Owner disclaimed claims 1, 2, and 5–7 in the Preliminary Response, challenged claims 3 and 4 remain, and, as such, the issues Petitioner “raised” specific to those claims have yet to be “decided.” Here, we emphasize in particular that Petitioner’s Ground 2, as originally presented and before filing of the disclaimer, includes only claims 3 and 4. Pet. 16, 30–31. Estopping Patent Owner from defending these claims by mere virtue of their dependence from a disclaimed claim, as Petitioner asks

us to do, would undermine our ability to determine whether Petitioner’s Ground 2 meets the “reasonable likelihood” standard governing *inter partes* review. *See* 35 U.S.C. § 314(a) (stating institution of an *inter partes* review may not be authorized unless it is determined “that the information presented in the petition filed under section 311 *and any response filed under section 313* 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)). Estoppel would similarly impact our review of the remaining challenges that include claims 3 and 4. Pet. 32–59. In other words, applying the estoppel doctrine to non-disclaimed claims 3 and 4 here would prevent us from doing precisely what the statute requires, i.e., fully considering the reasons set forth in the Preliminary Response as to “why no *inter partes* review should be instituted” as to those claims. 35 U.S.C. §§ 313, 314.

Third, contrary to what Petitioner’s Reply suggests, Patent Owner does not rely solely on the limitations recited in disclaimed claim 1 when defending the patentability of remaining claims 3 and 4. Pet. Reply 2; *see also id.* at 4 (discussing only Patent Owner’s arguments specific to the Grounds 4 and 5 challenges based on the Kono¹ reference). Rather, Patent Owner’s arguments directed to Petitioner’s Ground 2—which, again, is limited to claims 3 and 4 (Pet. 16, 30–31)—are largely directed to the alkali metal concentration recited in dependent claims 3 and 4. Prelim. Resp. 9–12; *see also id.* at 23, 26 (arguing that the reference cited in Petitioner’s

¹ Ex. 1008, US 6,743,508 B2, issued June 1, 2004.

Ground 6 based on obviousness of claims 3 and 4 over Kaulbach² does not “appreciate the criticality of minimizing or eliminating alkali metals.”).

Fourth, the *Smith & Nephew, Inc. v. Arthrex, Inc.* case upon which Petitioner relies is inapposite and does not compel a result different than we reach here. As Patent Owner correctly notes (PO Sur-Reply 2), and Petitioner itself recognizes (Pet. Reply 2–3), the Board in that case declared an adverse judgment after the patent owner disclaimed *all* claims. *Smith & Nephew, Inc. v. Arthrex, Inc.*, Case IPR2016-00917 (PTAB Sept. 21, 2016) (Paper 12). The patent owner’s disclaimer in *Smith & Nephew* falls squarely within the text of rule governing what may be construed as an adverse judgment, because it was “such that the party has no remaining claim in the trial.” 37 C.F.R. § 42.73(b)(2). That is simply not the case here, because claims 3 and 4 remain in this proceeding.

In view of the above, we decline Petitioner’s request to i) enter adverse judgment against disclaimed claims 1, 2, and 5–7 of the ’431 patent, and ii) estop Patent Owner from defending the patentability of claims 3 and 4, which remain in this proceeding.

C. *Institution of Inter Partes Review*

i. *Statutorily Disclaimed Claims 1, 2, and 5–7*

On April 24, 2018, the United States Supreme Court held that a decision to institute an *inter partes* review under 35 U.S.C. § 314 may not proceed on fewer than all claims challenged in the petition. *SAS Inst., Inc. v. Iancu*, 138 S. Ct. 1348, 1355 (2018). The Court recognized, however, that all “claims challenged ‘in the petition’ will not always survive to the end of

² Ex. 1009, Kaulbach et al., US 6,541,588 B1, issued April 1, 2003.

the case; some may drop out thanks to the patent owner's actions.” *Id.*
at 1357.

Here, challenged claims 1, 2, and 5–7 of the '431 patent have been
statutorily disclaimed by Patent Owner. Ex. 2005. 37 C.F.R. § 42.107(e)
instructs that “[n]o *inter partes* review will be instituted based on disclaimed
claims.” Thus, the rule precludes institution of an *inter partes* review on the
basis of disclaimed claims 1, 2, and 5–7 of the '431 patent.

ii. Claims 3 and 4

We now turn to the merits of the issues raised regarding claims 3 and
4 of the '431 patent in the Petition and the Preliminary Response. We have
jurisdiction under 35 U.S.C. § 314, which provides that an *inter partes*
review may not be instituted “unless . . . 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). Upon consideration of the
Petition and the Preliminary Response, and the evidence of record, we
determine that Petitioner has shown a reasonable likelihood that it would
prevail in showing the unpatentability of at least one of claims 3 and 4.

Accordingly, we institute an *inter partes* review of claims 3 and 4 of
the '431 patent.

D. Related Proceedings

The parties identify the following district court proceeding as related
to the '431 patent: *Chemours Company FC, LLC v. Daikin Industries, Ltd.*,,
U.S. District Court for the District of Delaware, Civil Action No. 1:17-cv-
01612-GMS. Pet. 60; Paper 4, 2.

E. The '431 Patent (Ex. 1001)

The '431 patent, titled "High Melt Flow Fluoropolymer," issued on December 13, 2011. Ex. 1001, at [54], [45]. The '431 patent relates to partially-crystalline fluoropolymers that are copolymers of tetrafluoroethylene ("TFE") and hexafluoropropylene ("HFP"). *Id.* at 2:7–10. Such copolymers, also known as fluorinated ethylene-propylene or "FEP" copolymers, "can be extruded at high speed onto conductor over a broad polymer melt temperature range to give insulated wire of high quality." *Id.* at 1:59–61; 7:53–55; Ex. 1002 ¶ 24.

F. Challenged Claims

Claims 3 and 4 of the '431 patent each depend from and include the limitations of now disclaimed independent claim 1. Disclaimed claim 1, and remaining claims 3 and 4 are reproduced below:

1. A partially-crystalline copolymer comprising tetrafluoroethylene [TFE], hexafluoropropylene [HFP] in an amount corresponding to hexafluoropropylene index (HFPI) of from about 2.8 to 5.3, said copolymer having less than about 50 ppm alkali metal ion, having a melt flow rate of within the range of about 30 ± 3 g/10 min as determined by ASTM D1238 at 372° C., and having no more than about 50 unstable endgroups/ 10^6 carbon atoms.
3. The polymer of claim 1 wherein said copolymer has less than about 10 ppm alkali metal ion.
4. The polymer of claim 1 wherein said copolymer has less than about 5 ppm alkali metal ion.

Ex. 1001, 6, 10:9–22.

G. *The Asserted Grounds of Unpatentability*

Reference(s)	Basis	Claims Challenged
Hiraga, ³ Kaulbach	§ 103(a)	3, 4
Hiraga	§ 103(a) ⁴	3, 4
Kono	§ 102(e)(2) and § 103(a)	3, 4
Kaulbach	§ 103(a)	3, 4

II. ANALYSIS

A. *Claim Construction*⁵

In an *inter partes* review, claim terms in an unexpired patent are interpreted according to their broadest reasonable constructions in light of the Specification of the patent in which they appear. *See* 37 C.F.R. § 42.100(b); *Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2142 (2016). Under the broadest reasonable construction standard, claim terms are presumed to have their ordinary and customary meaning, as would be understood by one of ordinary skill in the art in the context of the entire

³ Ex. 1025, Hiraga et al., JP 2002-249585, published September 6, 2002 (as translated).

⁴ Petitioner’s anticipation challenge based on Hiraga is now moot in view of Patent Owner’s disclaimer of all claims included in this challenge.

⁵ The revised claim construction standard for interpreting claims in *inter partes* review proceedings as set forth in the final rule published October 11, 2018 does not apply to this proceeding because the new “rule is effective on November 13, 2018 and applies to all IPR, PGR and CBM petitions filed on or after the effective date.” Changes to the Claim Construction Standard for Interpreting Claims in Trial Proceedings Before the Patent Trial and Appeal Board, 83 Fed. Reg. 51340 (Oct. 11, 2018) (to be codified at 37 C.F.R. pt. 42).

disclosure. *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007). Only terms that are in controversy need to be construed, and then only to the extent necessary to resolve the controversy. *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999).

Petitioner offers proposed constructions for two recited limitations, namely, “about 30±3 g/10 min” and “about 50 unstable endgroups.” Pet. 16–20. The latter construction concerns the phrase “unstable endgroup.” *Id.* at 20. Petitioner notes that although the '431 patent exemplifies four unstable endgroups (–CONH₂, –CF₂CH₂OH, –COF, and –COOH), “other unstable endgroups are also possible,” such as ethyl endgroups. *Id.* (citing Ex. 1002, 34 ¶¶ 77, 78; Ex. 1035, 5). Thus, Petitioner urges that the broadest reasonable construction of the term “unstable endgroup” includes such “endgroups resulting from any FEP polymerization process” and not only those species exemplified in the '431 patent. *Id.* Patent Owner accepts Petitioner’s proposed claim construction for the term “unstable endgroups.” Prelim. Resp. 9 n.1.

For purposes of this Decision, we construe the term “unstable endgroups” to include not only those unstable endgroups exemplified in the '431 patent, but “[all] unstable endgroups resulting from any FEP polymerization process” as agreed to by the parties. Based on the record before us, we determine that no other claim terms require an explicit construction at this time.

B. Asserted Obviousness Ground based on Hiraga and Kaulbach

Petitioner asserts that claims 3 and 4 of the '431 patent are unpatentable as obvious under 35 U.S.C. § 103(a) over Hiraga in view of Kaulbach. Pet. 30–31; Exs. 1009, 1025. Petitioner relies on the Declaration

of Dr. Robert Iezzi (Ex. 1002) to support its obviousness challenge. *Id.* at 30–31; Ex. 1002, 48–50.

i. Overview of Hiraga (Ex. 1025)

Hiraga discloses methods of modifying a fluoropolymer via a melt-kneading process. Ex. 1025, 1 at (57). Hiraga discloses that the modification method efficiently stabilizes unstable groups contained on the melt-processable fluoropolymer, homogenizes and prevents a decrease in the fluoropolymer’s molecular weight, and increases the fluoropolymer’s processability, thus enabling the production of “a molded article free of air bubbles and coloration.” *Id.* ¶ 11.

Hiraga’s method “may be applied to any melt-processable fluorine-containing polymer having unstable groups, but is particularly effective as a stabilization treatment for the unstable groups of” copolymers containing “tetrafluoroethylene (TFE) [and] hexafluoropropylene (HFP),” also known as “FEP” polymers. *Id.* ¶¶ 19, 26. According to Hiraga, unstable groups include vinyl end groups ($-\text{CF}=\text{CF}_2$) and acid fluoride end groups ($-\text{COF}$), and may cause bubbles and cavities to form in the final product. *Id.* ¶ 3.

To achieve “the most homogeneous molecular weight possible, and not simply stabilize the unstable groups,” Hiraga teaches that it is important “that water is not present” during the first step, i.e., “step (A),” “in which the treatment with oxygen-containing gas is carried out.” *Id.* ¶ 30. Because the fluoropolymer’s unstable groups cannot be stabilized in the presence of oxygen alone, however, it “is melt-kneaded in the presence of oxygen while further aggressively introducing water, thereby both stabilizing the unstable groups and also oxidizing to remove coloration substances (step (B)).” *Id.* ¶ 41. Hiraga discloses that a reaction accelerator may be added before or

during either step A or B, and that such reaction accelerators may be a compound containing an alkaline metal, an alkaline earth metal, an ammonium salt, ammonia, an alcohol, an amine, or a salt thereof. *Id.* ¶¶ 48–49.

Hiraga discloses Comparative Example 1 wherein a modified FEP polymer containing 15 ppm potassium was processed to yield a FEP copolymer with a melt flow rate of 30.0 g/10 min, and zero unstable groups per 10⁶ carbons. *Id.* ¶¶ 107, 114–117.

ii. Overview of Kaulbach (Ex. 1009)

Kaulbach discloses “melt-processable tetrafluoroethylene (TFE)/hexafluoropropylene (HFP) copolymer melt pellets having an improved processability for wire and cable application and to a method of using this polymer to coat wire and cable conductors.” Ex. 1009, 1:9–13. Kaulbach teaches that metal contaminants in the copolymer may cause it to degrade or decompose at high processing temperatures, which may in turn cause discoloration and “a build up of die drools.” *Id.* at 2:4–8. According to Kaulbach, “[d]ie drools are accumulations of molecular fractions of the polymer at the surface of the die exit” and “impair the coating processing.” *Id.* at 2:8–10. To assist with this and other potential problems, Kaulbach instructs that the copolymer “should be made more thermally stable not only by eliminating the thermally unstable endgroups but also by avoiding metal contaminants.” *Id.* at 2:27–29. Kaulbach discloses that a “preferred version of the polymerization recipe here is an alkali metal salt-free recipe.” *Id.* at 4:44–45.

iii. Analysis

In asserting that claims 3 and 4 are unpatentable as being obvious over the combined disclosures of Hiraga and Kaulbach, Petitioner specifically points to Hiraga's Comparative Example 1, which is a FEP polymer containing 15 ppm of potassium, an alkali metal. Pet. 30. Petitioner then turns to Kaulbach's disclosure regarding certain benefits that may be realized by avoiding metal contamination, specifically alkali metal contamination, when processing melt-processable FEP. *Id.*

Petitioner asserts that the skilled artisan, "[a]rmed with the teachings of Kaulbach . . . would have been motivated to avoid using alkali metal in Hiraga's Comparative Example 1, and instead, would have employed one of the other reaction accelerators Hiraga discloses." *Id.* at 30–31. Petitioner urges that "[d]oing so would result in a final copolymer with no potassium (or other alkali metal)," thus meeting the "less than about 10 ppm alkali metal ion" and "less than about 5 ppm alkali metal ion" limitations in claims 3 and 4, respectively. *Id.* at 31.

Petitioner asserts further that the disclosures of Hiraga and Kaulbach are properly combinable because each reference is "directed to the same technology and seek to obtain the same benefits," and also focus on preparing "copolymers of high [melt flow rate] that are stabilized to remove unstable endgroups." *Id.* As such, the skilled artisan, upon considering Hiraga's Comparative Example 1, "would have logically looked to Kaulbach for ways to further improve the melt-processability of the copolymer," and would have reasonably expected "improved processability and low incidences of flaws" in a FEP copolymer by avoiding metal contamination therein as taught by Kaulbach. *Id.*

Patent Owner first argues that neither Hiraga nor Kaulbach “discloses or suggests the importance of minimizing metal ion concentration.” Prelim. Resp. 10. Patent Owner points to Hiraga’s use of alkali metal salts as polymerization initiators and reaction accelerators, and argues that Kaulbach “is primarily concerned with non-alkali metals—such as iron, chromium, and nickel—and teaches that such metals can lead to polymer decomposition.” *Id.* at 11. Patent Owner alleges that Petitioner “relies on one lone sentence in Kaulbach stating that alkali metal salt-free recipes are preferred,” but that Kaulbach fails to explain why there is such a preference and allows for alkali metal salts such as potassium and sodium to be used. *Id.* 11–12. Patent Owner thus urges that “taken as a whole, Kaulbach does not appreciate the criticality of minimizing alkali metal salt concentration.” *Id.* at 12.

Based on this preliminary record, we disagree with Patent Owner. We note that Petitioner does not solely rely on “one lone sentence” within Kaulbach to support its argument as Patent Owner contends. Prelim. Resp. 11. Rather, Petitioner identifies four passages in Kaulbach. Pet. 30 (citing Ex. 1009, 2:4–11, 2:27–31, 4:45–46, and 5:14–17). Kaulbach’s disclosure as identified by Petitioner goes beyond merely discouraging the presence of *alkali* metal salts in FEP polymers, but rather instructs to avoid “metal contaminants” generally in such polymers. *See* Ex. 1009, 2:4–6, 27–31 (explaining that metal contamination should be avoided because “[m]etal contaminants are difficult to cope with” and “may result in degradation and decomposition of the copolymer at high processing temperatures” leading to problems with the coating process such as die drool); *see also id.* at 4:19–20 (identifying metal contaminants such as iron, nickel, and chromium “in

particular,” but not limiting metal contaminants to only these three species). Therefore, because Kaulbach discusses specific problems known to occur when processing FEP polymers that contain metal contaminants generally, i.e., metal contamination not necessarily limited to alkali metal salts, we decline to read Kaulbach’s disclosure as narrowly as Patent Owner urges.

Furthermore, we are not persuaded by Patent Owner’s argument that because Kaulbach “teaches that potassium persulfate and sodium bicarbonate may be used” in the same paragraph in which Kaulbach discloses a preference for “an alkali metal salt-free recipe,” Kaulbach does not appreciate why alkali metal salts should be minimized. Prelim. Resp. 11–12; Ex. 1009, 4:28–34, 44–45. Here, Kaulbach teaches that an initiator such as ammonium or potassium persulfate may be used in the polymerization reaction. Ex. 1009, 4:27–30. Kaulbach further discloses that buffers such as ammonia, ammonium carbonate, and sodium bicarbonate “can be incorporated in the recipe.” *Id.* at 4:32–33. Kaulbach does not state, however, that such initiators or buffers are required components of the polymerization reaction, but instead indicates that they “may be” or “can be” used. *Id.* at 4:27–30, 32–33. Also, should an initiator and/or buffer be used, Kaulbach provides alkali-metal free options from which to choose. *Id.* Thus, Kaulbach’s teaching that potassium persulfate and sodium bicarbonate *may* be used does not negate Kaulbach’s overall teaching that metal contaminants are problematic and should be avoided. *See In re Fritch*, 972 F.2d 1260, 1264 (Fed. Cir. 1992) (“It is well settled that a prior art reference is relevant for all that it teaches to those of ordinary skill in the art.”).

iv. Conclusion

For these reasons, based on the record currently before us, including Petitioner’s claim chart demonstrating where each limitation of claim 1 may be found in Hiraga (Pet. 26–27), portions of the Hiraga and Kaulbach references identified by Petitioner, the supporting Declaration, and Petitioner’s proffered reasons to combine these references (Pet. 30–31), we conclude that Petitioner has demonstrated a reasonable likelihood that it would prevail in showing that claims 3 and 4 are unpatentable as being obvious over Hiraga and Kaulbach.

C. Asserted Obviousness Ground Based on Hiraga Alone

Petitioner asserts that Hiraga alone renders claims 3 and 4 of the ’431 patent⁶ obvious under 35 U.S.C. § 103(a) because the skilled artisan would have found it obvious to substitute Hiraga’s melt-kneading process with an alternative fluorination process, “or to use melt-kneading only to adjust the [melt flow rate] of the copolymer and separately remove unstable endgroups using fluorination.” Pet. 32 (citing Ex. 1002 ¶¶ 137–140). Petitioner asserts that the skilled artisan would have been motivated to use such a fluorination process in Hiraga “for many reasons,” including because the skilled artisan would have understood that fluorination is “an alkali metal free stabilization method,” and also “provides benefits compared to other stabilization techniques, such as Hiraga’s wet-heat treatment.” Pet. 32 (citing Ex. 1002 ¶ 139). Petitioner points to evidence that purportedly demonstrates fluoropolymers containing endgroups that are stabilized via a fluorination

⁶ Although Petitioner challenges claims 1–7 (Pet. 32–33), we need only consider claims 3 and 4 in view of the statutory disclaimer of claims 1, 2, and 5–7. Ex. 2005.

process have “better electrical properties than those untreated or treated using different means.” *Id.* at 32–33 (citing Ex. 1027, 3:34–39).

Patent Owner challenges Petitioner’s assertion that it would have been obvious to modify Hiraga’s process in the manner proposed. Prelim. Resp. 12–15. Specifically, Patent Owner notes Hiraga’s emphasis on a two-step melt-kneading process, describing it as “the present invention,” and that the proffered substitution “would eviscerate [Hiraga’s] core invention.” *Id.* at 13. Patent Owner also questions how fluorination would achieve Hiraga’s stated objective (Ex. 1025 ¶ 30) to “adjust the molecular weight and create a polymer with the most homogeneous molecular weight possible, and not simply stabilize the unstable groups,” because Petitioner failed to provide evidence to demonstrate “that fluorination has any impact on molecular weight.” Prelim. Resp. 14. Patent Owner also contends that Hiraga does not recognize the need for minimizing alkali metal salt concentration, because it teaches such salts as polymerization initiators and reaction accelerators. *Id.* Additionally, Patent Owner avers that “Hiraga does not appreciate the importance of the claimed high [melt flow rate] range,” because Comparative Example 1 achieved melt flow rates of 30.0 and 38.1 g/10 min which each fall outside a target range “of between 22.5 to 28.0 g/10 min.” *Id.* at 14–15.

For several reasons, we do not agree that Petitioner has established a reasonable likelihood that claims 3 and 4 are obvious based on the disclosure of Hiraga alone.

First, as noted by Patent Owner (Prelim. Resp. 14), Hiraga is not only focused on stabilizing unstable endgroups of fluoropolymers, but also seeks to tailor the fluoropolymer’s molecular weight in order to “create a polymer

with the most homogeneous molecular weight possible.” Ex. 1025 ¶ 30. Petitioner fails to explain how, or provide evidentiary support to reasonably establish that, substituting both steps of Hiraga’s two-step melt-kneading process with a fluorination process would have any impact on a fluoropolymer’s molecular weight. We note Petitioner’s recognition that a polymer’s molecular weight is inversely related to its melt flow rate. Pet. 9 (citing Ex. 1009, 6:33–35; Ex. 1006, 3:21–27; Ex. 1002 ¶ 50). Thus, it is unclear what impact, if any, a fluorination process would have on the melt flow rate of the polymer disclosed in Hiraga’s Comparative Example 1—i.e., the polymer that Petitioner relies on in its obviousness challenge. Pet. 32–33. We emphasize that, prior to melt-kneading, Comparative Example 1 has a melt flow rate outside the claimed range of “about 30 ± 3 g/10 min,” i.e., 25 g/10 min. Ex. 1025 ¶¶ 107, 114, 117. Only after melt-kneading does the polymer exhibit a melt flow rate falling within the recited range. Although Petitioner urges that it likewise would have been obvious to modify the fluoropolymer’s molecular weight by melt-kneading “and separately remove unstable endgroups using fluorination,” Petitioner does not sufficiently explain why the skilled artisan would do so. Pet. 32–33.

Furthermore, even if the skilled artisan were to substitute one or both of Hiraga’s melt-kneading steps with a fluorination process as proposed by Petitioner, Petitioner has not established that the proffered substitution would yield the alkali metal ion concentrations of “less than about 10 ppm” and “less than about 5 ppm” recited in claims 3 and 4, respectively. Petitioner asserts that “Hiraga’s melt-kneading process to eliminate unstable endgroups can introduce alkali metal to the copolymer.” *Id.* Petitioner has not explained, however, how melt-kneading the polymer of Hiraga’s

Comparative Example 1 for the limited purpose of adjusting its melt flow rate would result in a polymer with the recited alkali metal ion concentrations. Such explanation is particularly necessary here because Hiraga's Comparative Example 1 polymer contains a potassium concentration of 15 ppm *prior to* the melt-kneading process. Ex. 1025 ¶¶ 107, 114. Additionally, notwithstanding the deficiencies outlined above regarding the unknown impact of fluorination on a given polymer's molecular weight, Petitioner fails to sufficiently address how eliminating both of Hiraga's melt-kneading steps in favor of a fluorination process of Comparative Example 1 would yield the recited metal concentrations.

We are, therefore, not persuaded that Petitioner has established a reasonable likelihood of establishing that claims 3 and 4 are unpatentable over the disclosure of Hiraga alone.

D. Asserted Anticipation and Obviousness Grounds based on Kono

Petitioner asserts that claims 3 and 4 of the '431 patent are anticipated by and/or rendered obvious in view of Kono. Pet. 33–50.

i. Overview of Kono (Ex. 1008)

Kono discloses pellets which comprise “a copolymer obtained by copolymerizing monomer components containing tetrafluoroethylene (TFE) and hexafluoropropylene (HFP),” also known as a “FEP pellet.” Ex. 1008, 3:32–36. Kono discloses that the inventive FEP pellet is used in a coating extrusion process for insulating a core wire, i.e., by melting the FEP pellet “by heating within an extruder for coating a core wire and extruded from a die, and then drawn down by coating the core wire to thereby form an insulated cable.” *Id.* at 4:29–34.

Kono discloses that the extrusion process with the inventive FEP pellet can be carried out at a speed of 2800 ft/min when the adhesive strength between the insulating material and the core wire is 0.8 kg or more. *Id.* at 4:42–50. Kono hypothesizes that the “excellent adhesive strength” exhibited by the inventive FEP pellets when extruded may be due to the presence of a certain functional group, also known as an “adhesion factor” or, if the adhesion factor is located at end of the polymer, as an “adhesion terminus.” *Id.* at 5:1–9. Kono teaches that the functional group is “not particularly limited as long as it contributes to enhanced adhesion with the core wire at high temperature, and includes, for example, a functional group which is generally known to be unstable at high temperature.” *Id.* at 5:14–18. Kono identifies several such known functional groups, including –COOM, –SO₃M, –OSO₃M, –SO₂F, –SO₂Cl, –COF, –CH₂OH, –CONH₂, and –CF=CF₂, where M is selected from an alkyl group, a hydrogen atom, a metallic cation and a quaternary ammonium cation. *Id.* at 5, 5:18–22.

Kono discloses that the number of functional groups located at the terminal portion of the polymer depends on a number of factors, including the polymer’s melt flow rate and the monomers present therein. *Id.* at 5:23–27.

Kono discloses example pelletized FEP powders where, *inter alia*, the number of certain functional groups (i.e., “adhesion terminus” groups) per 10⁶ carbon atoms were measured. *Id.* at 12:11–16:47. The “adhesion terminus” groups measured for Kono’s Examples 1–7 and Kono’s Comparative Examples 1–5 were limited to –COF, –COOH, and –CH₂OH. *Id.* at 15:1–18:20.

ii. Anticipation Analysis

Petitioner asserts that claims 3 and 4 are anticipated by Kono because “Kono discloses copolymers in Example 2 and Comparative Example 3 meeting each and every limitation of” these claims. Pet. 35. Petitioner provides a detailed explanation alleging where each limitation can be found in Kono for these claims. *Id.* at 35–45, 47–48 (citing Ex. 1002 ¶¶ 142–172).

Patent Owner challenges Petitioner’s position that claims 3 and 4 are anticipated by Kono. Prelim. Resp. 15–20. Specifically, Patent Owner avers that Petitioner’s anticipation challenge fails because Kono does not disclose a FEP polymer “having no more than about 50 unstable endgroups per 10^6 carbon atoms” as required by claims 3 and 4. *Id.* at 15. According to Patent Owner, using Petitioner’s construction of the limitation “unstable endgroup,” there is “no evidence demonstrating that Kono’s FEPs necessarily lack any other unstable endgroups” beyond those measured, i.e., –COOH, –COF, and –CH₂OH. *Id.*; *see also id.* at 16–20. According to Patent Owner, Kono’s disclosure of 15–150 unstable endgroups per million (i.e., 10^6) carbon atoms does not include endgroups other than –COOH, –COF, and –CH₂OH. *Id.* at 16. Further, Patent Owner contends that Kono’s broad range of 15–150 for the –COOH, –COF, and –CH₂OH endgroups does not anticipate the claimed range of “no more than about 50 unstable endgroups/ 10^6 carbon atoms,” which includes unstable endgroups other than those disclosed in Kono. *Id.* at 17.

We agree with Patent Owner that, on this record, Petitioner fails to establish a reasonable likelihood that Kono anticipates claims 3 and 4 of the ’431 patent. In particular, Petitioner fails to provide sufficient evidence to establish that Kono discloses a FEP polymer with the recited number of

unstable endgroups, i.e., “no more than about 50 unstable endgroups/10⁶ carbon atoms.” We begin with Petitioner’s claim construction of the term “unstable endgroups” (Pet. 20), which we adopted for purposes of this Decision (Section II.A., *supra*), namely, that the term “unstable endgroups” includes not only those unstable endgroups exemplified in the ’431 patent, but “all unstable endgroups resulting from any FEP polymerization process.” Such unstable endgroups include ethyl groups (–CF₂CH₂CH₃). Ex. 1002 ¶ 78; Ex. 1035 ¶ 2.6; *see also* Ex. 1008, 5:14–22 (reciting various known terminal functional groups that are “unstable at high temperature”); Ex. 1010, 5:38–39 (“[t]he presence of methanol can also lead to methyl ester ends (–CO₂CH₃)”); Ex. 1025 ¶¶ 3, 34, 44 (identifying a vinyl group (–CF=CF₂) along with carboxylic acid (–COOH) and acid fluoride (–COF) groups as unstable groups).

Petitioner also cites to Kono’s disclosure “that the number of –CH₂OH, –COOH, and –COF groups should be 15–150 per 10⁶ carbon atoms.” Pet. 41. However, as noted by Patent Owner, this range is specific to only three endgroups, and does not address other endgroups such as –CONH₂, methyl ester groups, and vinyl groups. Prelim. Resp. 16–17; Ex. 1008, 5:27–33. Simply stated, Petitioner’s reliance on Kono’s range of 15–150 –CH₂OH, –COOH, and –COF groups per million carbon atoms is insufficient to establish that Kono discloses “no more than about 50” of *all* possible unstable endgroups resulting from any FEP polymerization process per our construction of this limitation.

For the same reason, Petitioner’s reliance on Kono’s Example 2 and Comparative Example 3 likewise falls short of establishing anticipation of claims 3 and 4. Pet. 41–45. These specific embodiments only measured

“the numbers of the respective groups –COF, –COOH and –CH₂OH.”
Ex. 1008, 12:57–59, Table 1. Notably, Kono does not indicate whether two of the four exemplary endgroups identified in the ’431 patent are present, much less whether other possible unstable endgroups are present as well. This is particularly important here given how close the measured values already are to the claimed limit for *all* unstable endgroups; Kono’s Example 2 contains 58 of the measured endgroups while Comparative Example 3 has 50 of such endgroups. We additionally emphasize Patent Owner’s evidence that states that methanol may lead to unstable endgroups such as carbinol (–CH₂OH) and methyl ester endgroups (–CO₂CH₃). Ex. 1010, 5:35–51.

For these reasons, we agree with Patent Owner that, on this record, Petitioner fails to establish a reasonable likelihood that Kono anticipates claims 3 and 4.

iii. Obviousness Analysis

In support of its obviousness challenge, Petitioner relies on the same general disclosure of Kono as in its anticipation challenge, and additionally relies on Kono’s Comparative Example 5 as well as Kono’s disclosure of a fluorination process. Pet. 35–45, 47–50 (citing Ex. 1002 ¶¶ 142–172, 182–187).

Regarding Comparative Example 5, Petitioner acknowledges that Kono fails to disclose the recited melt flow rate “of within the range of about 30±3 g/10 min as determined by ASTM D1238 at 372° C.” Pet. 40. Petitioner alleges, however, that “Kono teaches copolymers with [a melt flow rate] of 30 g/10 min or more, and preferably 30–45 g/10 min.” *Id.* (citing Ex. 1008, 6:12–28). In view of the overlap between the claimed melt flow rate with Kono’s preferred range of 30–45 g/10 min, as well as “the

closeness of Comparative Example 5's" melt flow rate to that claimed, Petitioner asserts that the recited range would have been obvious. *Id.* Petitioner asserts that the skilled artisan "would have been able to optimize" Kono's reaction parameters as set forth in Comparative Example 5 "to achieve copolymers meeting the limitations of [claims 3 and 4] through routine experimentation and with a reasonable expectation of success." *Id.*

Petitioner further asserts that it would have been obvious for the skilled artisan to employ a fluorination process "for a reduced time or at a reduced temperature" to treat the polymers of Kono's Example 2 and Comparative Example 3 in order "to reduce the number of unstable endgroups to the minimum necessary for sufficient adhesion strength." Pet. 49–50. According to Petitioner, copolymers subjected to a fluorination process "were known to have benefits over those unstabilized or stabilized by other procedures, such as the wet-heat treatment of Kono, including better electrical properties obtained by converting $-\text{CF}_2\text{H}$ endgroups to $-\text{CF}_3$ endgroups." *Id.*

Patent Owner does not directly address Petitioner's assertions regarding Comparative Example 5's melt flow rate, but instead focuses on Kono's disclosure of only a limited number of unstable endgroups for all embodiments, including Comparative Example 5. Prelim. Resp. 17–21. Patent Owner argues that it would not have been obvious to fluorinate the FEP polymers of Kono because doing so would "undermine the purpose of Kono: to produce FEP pellets *with* unstable endgroups so as to increase adhesive strength between the FEP and the wire." *Id.* at 21. Patent Owner notes that Kono disparages Comparative Example 5 because it has no "reported unstable $-\text{COF}$, $-\text{COOH}$, and $-\text{CH}_2\text{OH}$ groups." *Id.* As such,

Patent Owner argues that the skilled artisan would not have been motivated to fluorinate Kono's FEP polymers, or use another terminal group stabilization treatment, and that Petitioner's allegation is "based solely on hindsight." *Id.* at 22–23.

We agree with Patent Owner. As we explained with respect to Petitioner's anticipation challenge of claims 3 and 4 based on Kono, Petitioner does not establish sufficiently that Kono discloses the recited unstable endgroup limitation. *See supra* Section II.D.ii. We also determine that Petitioner fails to identify a sufficient reason for the skilled artisan to have modified the teachings of Kono to arrive at the recited unstable endgroup range. In that regard, Kono expresses a desire to maintain unstable endgroups because these groups "contribute[] to enhanced adhesion [of the FEP] with the core wire at high temperature." Ex. 1008, 5:14–16. Kono describes Comparative Example 5, which has zero –COF and –COOH endgroups,⁷ as "inferior in adhesion strength" to Example 7 which has 21 –COOH groups. *Id.* at 18:36–40. Kono also states that Comparative Example 3, containing a total of 50 –COF, –COOH, and –CH₂OH endgroups, is "inferior in at least one of the evaluation criteria" such as spark-out, cone-breaks and adhesive strength between the insulating material and the core wire. *Id.* at 15:50–59.

In view of these teachings, Petitioner does not explain sufficiently why the skilled artisan would have been motivated to employ a fluorination process to minimize or eliminate unstable endgroups. Nor has Petitioner explained how the skilled artisan would even arrive at what "a sufficient

⁷ We observe that Kono gives no measurement value for CH₂OH groups. Ex. 1008, 18:19.

number of unstable endgroups” would be in designing the proffered fluorination process. Pet. 50. Thus, we agree with Patent Owner that Petitioner’s obviousness challenge of claims 3 and 4 based on Kono employs impermissible hindsight. Prelim. Resp. 23.

For these reasons, we agree with Patent Owner that, on this record, Petitioner fails to establish a reasonable likelihood that Kono renders obvious claims 3 and 4.

E. Asserted Obviousness Ground based on Kaulbach

Petitioner asserts that claims 3 and 4 of the ’431 patent are obvious in view of Kaulbach. Pet. 50–57 (citing Ex. 1002 ¶¶ 188–211). Petitioner specifically relies on Sample A11 of Kaulbach and alleges that “[i]n Sample A11, Kaulbach discloses a copolymer that renders obvious each and every limitation of claims [3 and 4] of the ’431 patent.” *Id.* at 51. Petitioner sets forth a detailed explanation of how Kaulbach’s Sample A11 purportedly meets or renders obvious the recited limitations. *Id.* at 52–57. Patent Owner disagrees that it would have been obvious to adjust Sample A11’s melt flow rate of 24 g/10 min⁸ to be within the recited “range of about 30±3 g/10 min,” and further challenges Petitioner’s view that Kaulbach desires “an alkali-metal free recipe.” Prelim. Resp. 23–27.

Based on the current record, we are not persuaded by Patent Owner’s arguments that i) Kaulbach fails “to appreciate the criticality of minimizing or eliminating alkali metals,” ii) “Kaulbach is primarily concerned with

⁸ The parties agree that Kaulbach incorrectly reports melt flow rate in units of g/min rather than in g/10 min. Pet. 53; Prelim. Resp. 24. For purposes of this Decision, we treat Kaulbach’s disclosure of melt flow rate in g/min as g/10 min.

polymer decomposition from non-alkali metals—iron, chromium, and nickel,” and iii) Kaulbach “expressly teaches that potassium persulfate and sodium bicarbonate—both alkali metal salts—may be used to prepare the FEP.” Prelim. Resp. 26. These arguments are similar to the arguments made by Patent Owner (*id.* at 11–12) that we addressed above with respect to Petitioner’s challenge based on Hiraga and Kaulbach, and are unpersuasive for the same reasons. *See supra* Section II.B.iii.

Turning now to Sample A11’s melt flow rate, Petitioner contends that the skilled artisan would have been motivated to increase the melt flow rate from 24 g/10 min to be within the claimed range. Pet. 53–55. Specifically, Petitioner points to Kaulbach’s general teaching that the “copolymers should have [a melt flow rate]⁹ of 15 g/10 min or higher,” and that Kaulbach provides no upper limit on what the melt flow rate should be. *Id.* at 54. Thus, Petitioner asserts that Kaulbach’s range completely encompasses the claimed range. Further, Petitioner avers that “[i]t was well known at the time of the ’431 patent that the higher the [melt flow rate] of the FEP-copolymer, the higher the speeds at which the copolymer can be processed.” *Id.* (citing Ex. 1002 ¶ 201; Ex. 1008, 2:51–53). Thus, Petitioner contends

⁹ The disclosure to which Petitioner refers discusses a melt flow index or MFI value. Ex. 1008, 1:40–41, 3:43–44. Patent Owner does not dispute that a “melt flow index” is any different than the recited “melt flow rate.” Rather, Patent Owner appears to acknowledge that these terms may be used interchangeably. *See* Prelim. Resp. 24–25 (referring to Kaulbach’s MFI as “a broad, open-ended MFR range of 15 g/10 min or higher”). For purposes of this Decision, we assume that the recited “melt flow rate” and Kaulbach’s “melt flow index” are interchangeable phrases describing the same parameter.

that the skilled artisan would have found it obvious to modify Sample A11 accordingly. *Id.* at 54–55.

Patent Owner argues that Kaulbach suggests that a copolymer with a melt flow rate of 24 g/10 min is the preferred embodiment, and the melt flow rates for Kaulbach’s sample polymers range from 20–24 g/10 min. Prelim. Resp. 24–25. Patent Owner also contends that the skilled artisan would not have been motivated to adjust the melt flow rate based on the knowledge in the art “that higher [melt flow rate] leads to higher processing speeds and that [melt flow rates] of 30 g/10 min or greater reduce melt fracture,” because Kaulbach tries to solve such issues in a different way — i.e., “through a narrow molecular weight distribution.” *Id.* at 25.

For several reasons, we agree that Petitioner has established a reasonable likelihood that claims 3 and 4 are obvious in view of Kaulbach.

We note that Kaulbach’s disclosure of a melt flow rate of greater than or equal to 15 g/10 min¹⁰ fully encompasses the recited range of 30±3 g/10 min. In such circumstances, the narrower range may be obvious, because “[s]electing a narrow range from *within* a somewhat broader range disclosed in a prior art reference is no less obvious than identifying a range that simply *overlaps* a disclosed range. In fact, when, as here, the claimed ranges are completely encompassed by the prior art, the conclusion is even more compelling than in cases of mere overlap.” *In re Peterson*, 315 F.3d 1325, 1329–30 (Fed. Cir. 2003) (citation omitted). We also note that Kaulbach’s

¹⁰ We note this disclosure of Kaulbach does not expressly recite the MFI units. Ex. 1008, 3:43–44. Because Patent Owner does not allege otherwise, but rather appears to concede the units are “g/10 min” (Prelim. Res. 24), we assume for purposes of this Decision that Kaulbach’s disclosure of “≥15” is a disclosure of “greater than or equal to 15 g/10 min.”)

disclosure is not limited to its preferred embodiments. *Fritch*, 972 F.2d at 1264. Thus, the melt flow rate of Sample A11, i.e., 24 g/10 min, does not negate Kaulbach's general teaching that "[f]or high speed wire extrusion the [melt flow rate] of the polymer is ≥ 15 [g/10 min]." Ex. 1009, 3:43–44.

We also are not persuaded, on this record, by Patent Owner's argument that because Kaulbach attempts to achieve "high processing rates" in a different way, the skilled artisan would not have considered Kono's technique for increasing the speed of wire coating extrusion process. Prelim. Resp. 25. Rather, we note that "if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill." *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 417 (2007).

Therefore, based on the current record, we agree that Petitioner has established a reasonable likelihood that claims 3 and 4 are obvious in view of Kaulbach.

III. CONCLUSION

For the foregoing reasons, we are persuaded that the Petition establishes a reasonable likelihood that Petitioner would prevail on its challenge to claims 3 and 4 of the '431 patent.

As discussed above, we question the sufficiency of Petitioner's contentions with respect to certain grounds, but nevertheless institute an *inter partes* review of claims 3 and 4 on all asserted grounds. Although we exercise our discretion and institute review, we remind the parties that we have not yet made a final determination as to the patentability of any of the challenged claims.

IV. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that, pursuant to 35 U.S.C. § 314(a), an *inter partes* review is hereby instituted as to claims 3 and 4 of the '431 patent with respect to the grounds set forth in the Petition; and

FURTHER ORDERED that pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4, notice is hereby given of the institution of a trial commencing on the entry date of this decision.

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