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UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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*Ex parte* YUNAN CHENG, TONG WU,  
YANGANG YAN, and YUXIAN AN

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Appeal 2018-007902  
Application 14/227,302  
Technology Center 1700

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Before ADRIENE LEPIANE HANLON, JAMES C. HOUSEL, and  
BRIAN D. RANGE, *Administrative Patent Judges*.

HANLON, *Administrative Patent Judge*.

DECISION ON APPEAL

A. STATEMENT OF THE CASE

The Appellant<sup>1</sup> filed an appeal under 35 U.S.C. § 134(a) from an Examiner's decision finally rejecting claims 1, 3, 4, 7, 8, 10, and 14–26. We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

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<sup>1</sup> We use the word “Appellant” to refer to “applicant” as defined in 37 C.F.R. § 1.42. Appellant identifies the real party in interest as SABIC Global Technologies B.V. Appeal Brief dated March 8, 2018 (“App. Br.”), at 1.

The claims on appeal are directed to a polymer composition that is said to be useful in a laser direct structuring (LDS) process, a method for making the polymer composition, and an article of manufacture comprising the polymer composition.

The Appellant discloses that electrical components can be provided as molded injection devices (MID) with printed conductors. Spec. ¶ 2. According to the Appellant, MIDs may be formed using an LDS process. Spec. ¶ 3. In an LDS process, a computer-controlled laser beam is said to travel over the MID to activate the plastic surface at locations where the conductive path is to be situated. Spec. ¶ 3. The Appellant discloses that with an LDS process, it is possible to obtain small conductive path widths (such as 150 microns or less) and a small spacing between conductive paths. Spec. ¶ 4. As a result, MIDs formed using an LDS process are said to save space and weight in end-use applications. Spec. ¶ 4.

The Appellant discloses that LDS technology is useful in mobile phones and notebooks where thinner, stronger, and multiple antenna functions are especially needed. Spec. ¶ 5. To meet those demands, polymer compositions that have good plating performance and high tensile strength and can be readily used in LDS processes are said to be needed. Spec. ¶ 6. The Appellant's polymer composition is said to satisfy those needs. Spec. ¶ 7.

The claimed polymer composition comprises a thermoplastic polymer, a copper-containing LDS additive, and a glass reinforcement component, wherein the polymer composition is capable of being plated after being activated using a laser. The polymer composition has a flexural modulus of greater than about 3 GPa, a tensile modulus of greater than about 3 GPa, and a plating index of from about 0.4 to about 2.0. The Appellant discloses that the amount of glass fiber in the polymer composition affects the flexural modulus, the tensile modulus, and the plating index. Spec. ¶ 167.

Representative claim 1 is reproduced below from the Claims Appendix.<sup>2</sup>

1. A polymer composition comprising:
  - a. a thermoplastic polymer selected from the group comprising polycarbonate, polycarbonate-polysiloxane copolymer, ethylene vinyl acetate, ethylene vinyl alcohol, polyoxymethylene, polyacrylate, polyacrylonitrile, polyamide-imide, polyetherketone, polycaprolactone, polyhydroxyalkanoate, polyimide, polyketone, polylactic acid, polyurethane, or polyvinyl acetate or a combination thereof;
  - b. a copper-containing laser direct structuring additive present in an amount up to about 8 wt. % based on the total weight of the composition; and
  - c. a glass reinforcement component present in an amount ranging from greater than 0% by weight to no greater than 50% by weight based on the total weight of the composition;wherein the polymer composition is capable of being plated after being activated using a laser and composition has a flexural modulus of greater than about 3 GPa and a tensile modulus of greater than about 3 GPa and a plating index of from about 0.4 to about 2.0.

Claims Appendix 2.

The Examiner maintains the following grounds of rejection on appeal:<sup>3</sup>

- (1) claims 1, 3, 4, 7, 8, 10, and 14–26 under 35 U.S.C. § 103 as unpatentable over Motegi 041<sup>4</sup> in view of Gemmell et al.<sup>5</sup> and Takano et al.;<sup>6</sup> and

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<sup>2</sup> In this Decision on Appeal, we refer to the Claims Appendix filed in the “Response to Notice of Non-Compliant Appeal Brief” dated April 26, 2018.

<sup>3</sup> The rejection of claims 1, 3, 4, 8, 10, and 14–25 under 35 U.S.C. § 112(a), based on the written description requirement, was withdrawn in the Examiner’s Answer dated June 1, 2018 (“Ans.”), at 8

<sup>4</sup> US 2015/0111041 A1, published April 23, 2015 (“Motegi 041”).

<sup>5</sup> US 5,384,353, issued January 24, 1995 (“Gemmell”).

<sup>6</sup> US 2015/0353714 A1, published December 10, 2015 (“Takano”).

(2) claims 1, 3, 4, 7, 8, 10, and 14–26 under 35 U.S.C. § 103 as unpatentable over Motegi 070<sup>7</sup> in view of Gemmell or Agarwal et al.,<sup>8</sup> and further in view of Takano.

## B. DISCUSSION

The Examiner finds Motegi 041 discloses a resin composition having a plating index within the claimed range, comprising polycarbonate, an LDS additive, and a glass filler in amounts within the ranges recited in claim 1. Final Act. 4.<sup>9</sup> The Examiner finds Motegi 041 discloses that the LDS additive comprises titanium oxide coated with antimony-doped tin oxide. Final Act. 4.

The Examiner finds Motegi 041 does not disclose that the resin composition (1) comprises a copper-containing LDS additive and (2) has a tensile modulus greater than about 3 GPa and a flexural modulus greater than about 3 GPa as recited in claim 1. Final Act. 5. The Examiner relies on Takano to show the copper-containing LDS additive recited in claim 1, and Gemmell to show the claimed tensile modulus and flexural modulus. Final Act. 5.

More specifically, the Examiner finds Gemmell discloses examples showing that “addition of glass fiber increases tensile modulus and flexural modulus of polycarbonate resins compositions.” Final Act. 5. In examples that include glass fibers, the Examiner finds that Gemmell’s polycarbonate resin compositions have a tensile modulus and a flexural modulus greater than 3 GPa as recited in claim 1. Final Act. 5. The Examiner concludes that it would have been obvious to one of ordinary skill in the art “to reasonably expect Motegi’s compositions comprising glass fillers to have a tensile modulus and flexural modulus greater than 3 GPa, or

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<sup>7</sup> US 2014/0162070 A1, published June 12, 2014 (“Motegi 070”).

<sup>8</sup> US 2006/0142455 A1, published June 29, 2006 (“Agarwal”).

<sup>9</sup> Final Office Action dated September 15, 2017.

to utilize Gemmell's coated fillers so as to improve the tensile modulus and flexural modulus to greater than 3 GPa." Final Act. 5–6.

The Appellant does not direct us to any error in the Examiner's factual findings or conclusions of law with respect to the combination of Motegi 041 and Gemmell. *See* App. Br. 13 (recognizing that "Gemmell is relied upon for the unremarkable observation that increasing amounts of glass fiber reinforcement in polycarbonate rein [sic, resin] compositions will increase the tensile modulus and flexural modulus of the composition. . . . That fact is not in dispute."). Thus, the dispositive issue on appeal is whether the Examiner reversibly erred in concluding that it would have been obvious to one of ordinary skill in the art to modify the polymer composition of Motegi 041 to include a copper-containing LDS additive as recited in claim 1, based on Takano's disclosure.

The Examiner finds Takano discloses thermoplastic resin compositions having a high mechanical strength while retaining plating properties, comprising a thermoplastic resin, glass fiber, and an LDS additive. Final Act. 5. The Examiner finds Takano discloses that suitable LDS additives include  $\text{CuCr}_2\text{O}_4$ ,  $\text{Cu}_3(\text{PO}_4)_2\text{Cu}(\text{OH})_2$ , antimony and tin oxide, and antimony oxide and tin oxide. Final Act. 5. The Examiner concludes that it would have been obvious to one of ordinary skill in the art "to utilize Takano's copper salt in lieu of Motegi's [041] antimony-doped tin oxide, based on their art recognized equivalence, with a reasonable expectation of success absent evidence of criticality for the claimed additive." Final Act. 5; *see also* Final Act. 11.

The Appellant argues that the composition of Motegi 041 is based on polycarbonate resins while Takano prefers polyamide or polyester and unlike Motegi 041, Takano requires the use of S-glass. App. Br. 12. The Appellant argues that compositions using a glass fiber outside the scope of Takano's

invention (i.e., non-S-glass as disclosed in Comparative Examples 1–5) were reported to be poor in mechanical strength. App. Br. 10 (citing Takano ¶ 100); *see also* App. Br. 14 (arguing that the results disclosed in Takano “hinge on the use of S-type glass fibers”). Therefore, the Appellant argues that “plucking a specific LDS additive from Takano and using it in a non-S-glass based resin composition as in [Motegi 041] does not provide an adequate factual basis to predict anything in regard to the mechanical and plating properties that the resulting composition would possess.” App. Br. 12. In urging a reversal, the Appellant argues that the facts in *Kinetic Concepts, Inc. v. Smith & Nephew, Inc.*, 688 F.3d 1342 (Fed. Cir. 2012),<sup>10</sup> “are the facts in this case.” App. Br. 11.

In *Kinetic Concepts*, 688 F.3d at 1346–47, the claims were directed to an apparatus and a method for treating wounds by applying negative pressure. In addressing the obviousness of the claimed invention, the Court stated:

[B]oth of these references independently accomplish similar functions, namely, draining fluids. Because each device independently operates effectively, a person having ordinary skill in the art, who was merely seeking to create a better device to drain fluids from a wound, would have no reason to combine the features of both devices into a single device.

*Id.* at 1369.

The Court explained that hindsight provided the only discernable reason to combine the prior art references because none of the references disclosed that negative pressure could be used to treat wounds. *Id.* The Court noted that “this is

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<sup>10</sup> The Appellant identifies the case reported at 688 F.3d 1342 (Fed. Cir. 2012) as “*Kinetic Concepts, Inc. v. Bluesky Med. Corp.*” App. Br. 11. However, a search using Westlaw reveals that the Defendant–Appellee in the case is “Smith & Nephew, Inc.,” not “Bluesky Med. Corp.”

not even a case where the inventions at issue are merely composed of elements that were known in the art.” *Id.* at 1369–70.

In contrast to *Kinetic Concepts*, Motegi 041 and Takano both disclose polymer compositions that include polycarbonate resin,<sup>11</sup> an LDS additive, and a glass filler such as S-glass.<sup>12</sup> See *In re Lamberti*, 545 F.2d 747, 750 (CCPA 1976) (“all disclosures of the prior art, including unpreferred embodiments, must be considered”); *Merck & Co., Inc. v. Biocraft Labs., Inc.*, 874 F.2d 804, 807 (Fed. Cir. 1989) (disclosure of “a multitude of effective combinations does not render any particular formulation less obvious,” especially where “the claimed composition is used for the identical purpose taught by the prior art”).

Motegi 041 discloses LDS additives comprising titanium oxide coated with a composition comprising tin as a main component and antimony (i.e., coating composition). Motegi 041, at ¶ 62. Motegi 041 discloses that the coating composition may also comprise other metals including copper. Motegi 041, at ¶ 67. Takano discloses that the LDS additive, in a first embodiment, is an oxide containing copper, and in a second embodiment, preferably contains both antimony and tin. Takano ¶¶ 28, 29.

Based on the foregoing, a preponderance of the evidence supports the Examiner’s conclusion of obviousness as to claim 1. That is, one of ordinary skill

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<sup>11</sup> See Motegi 041, at ¶ 26 (disclosing that “[t]he polycarbonate resin used in the present invention is not particularly limited”); Takano ¶ 13 (disclosing that “[t]he type of the thermoplastic resin is not specifically limited, and examples include polycarbonate resins”).

<sup>12</sup> See Motegi 041, at ¶ 49 (disclosing that “[t]he glass filler is made up of glass composition such as A glass, C glass, E glass, and S glass”); Takano ¶ 35 (disclosing that “an example of the glass fiber used in the present invention is S-glass (high strength glass)”).

in the art would have recognized that the copper-containing LDS additive disclosed in Takano would be a suitable substitute for the LDS additive disclosed in Motegi 041 because Motegi 041, like Takano, contemplates a polymer composition comprising a glass filler such as S-glass, as well as a copper-containing LDS additive. *See* App. Br. 15 (arguing that the equivalence of LDS additives “is strictly limited to LDS resin compositions that use S-type glass fiber as reinforcement”); Reply Br. 8<sup>13</sup> (arguing that “the Examiner’s alleged functional equivalence of Takano’s copper salt and Motegi’s antimony doped tin oxide only appropriately applies to compositions having S-type glass fibers”).

Moreover, Takano discloses that “[w]hen . . . an oxide containing copper [e.g.,  $\text{CuCr}_2\text{O}_4$  or  $\text{Cu}_3(\text{PO}_4)_2\text{Cu}(\text{OH})_2$ ] is used as an LDS additive, the advantages of the present invention tend to be produced more effectively.” Takano ¶ 28. Those advantages are said to be improving the mechanical strength of molded articles obtained by molding thermoplastic compositions while retaining the plating properties of the resin molded article. Takano ¶¶ 6, 7. Thus, one of ordinary skill in the art seeking to improve the mechanical strength and maintain the plating properties of the resin molded articles disclosed in Motegi 041, would have been motivated to modify Motegi’s resin composition to include a copper-containing LDS additive, as disclosed in Takano.<sup>14</sup>

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<sup>13</sup> Reply Brief dated August 1, 2018.

<sup>14</sup> For the first time on appeal, the Appellant argues, in the Reply Brief, that “[t]he instant claims recite particular unexpected values for modulus and plating performance.” Reply Br. 9. The Appellant does not direct us to any evidence of unexpected results. *See In re De Blauwe*, 736 F.2d 699, 705 (Fed. Cir. 1984) (unexpected results must be established by factual evidence; mere argument does not suffice). Nonetheless, the Appellant’s argument is untimely and will not be considered on appeal. 37 C.F.R. 41.41(b)(2)(2020).

For the reasons provided above, the obviousness rejection of claim 1 based on the combination of Motegi 041, Gemmell, and Takano is sustained. The Appellant does not present arguments in support of the separate patentability of any of claims 3, 4, 7, 8, 10, and 14–26. Therefore, the obviousness rejection of claims 3, 4, 7, 8, 10, and 14–26 based on the combination of Motegi 041, Gemmell, and Takano also is sustained.

Having sustained the obviousness rejection of all pending claims based on the combination of Motegi 041, Gemmell, and Takano, it is not necessary to address the obviousness rejection of those same claims based on the combination of Motegi 070, Gemmell, Agarwal, and Takano.

### C. CONCLUSION

The Examiner’s decision is affirmed.

In summary:

<b>Claims Rejected</b>	<b>35 U.S.C. §</b>	<b>Reference(s)/Basis</b>	<b>Affirmed</b>	<b>Reversed</b>
1, 3, 4, 7, 8, 10, 14–26	103	Motegi 041, Gemmell, Takano	1, 3, 4, 7, 8, 10, 14–26	
1, 3, 4, 7, 8, 10, 14–26 <sup>15</sup>	103	Motegi 070, Gemmell, Agarwal, Takano		
<b>Overall Outcome</b>			1, 3, 4, 7, 8, 10, 14–26	

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<sup>15</sup> As discussed above, it is not necessary to address the obviousness rejection of claims 1, 3, 4, 7, 8, 10, and 14–26 based on the combination of Motegi 070, Gemmell, Agarwal, and Takano based on our decision sustaining the obviousness rejection of those same claims based on the combination of Motegi 041, Gemmell, and Takano.

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

AFFIRMED