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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/012,840	06/20/2018	Wenhua ZHANG	PT033329	1570
31217	7590	12/21/2021	EXAMINER	
Henkel Corporation One Henkel Way Rocky Hill, CT 06067			DIAZ, MATTHEW R	
			ART UNIT	PAPER NUMBER
			1761	
			NOTIFICATION DATE	DELIVERY MODE
			12/21/2021	ELECTRONIC

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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* WENHAU ZHANG, QINYAN ZHU,  
JOHN G. WOODS, HONG (DOROTHY) JIANG,  
JUNJUN WU, and MARK JASON

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Appeal 2021-005022  
Application 16/012,840  
Technology Center 1700

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Before CATHERINE Q. TIMM, DEBRA L. DENNETT, and  
MERRELL C. CASHION, JR., *Administrative Patent Judges*.

DENNETT, *Administrative Patent Judge*.

DECISION ON APPEAL<sup>1</sup>

STATEMENT OF THE CASE

Pursuant to 35 U.S.C. § 134(a), Appellant<sup>2</sup> appeals from the  
Examiner’s decision to reject claims 1–3, 5–15, 20–26, 28–30, 32, and 33 of

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<sup>1</sup> In our Decision, we refer to the Specification (“Spec.”) of Application No. 16/012,840 filed June 20, 2018; the Final Office Action dated Nov. 5, 2020 (“Final Act.”); the Advisory Action dated Jan. 14, 2021 (“Adv. Act.”); the Appeal Brief filed Mar. 31, 2021 (“Appeal Br.”); the Examiner’s Answer dated June 21, 2021 (“Ans.”); and the Reply Brief filed Aug. 19, 2021 (“Reply Br.”).

<sup>2</sup> “Appellant” refers to “applicant” as defined in 37 C.F.R. § 1.42. Appellant identifies Henkel IP & Holding GmbH as the real party in interest. Appeal Br. 2.

Application 16/012,840, which constitute all the claims pending in this application. We have jurisdiction under 35 U.S.C. § 6(b).

For the reasons set forth below, we REVERSE.

The subject matter of the invention relates to conductive compositions with improved conductivity said to be attributable to the addition of one or more polymer emulsions as binder and one or more sintering agents in a conductive composition having metal particles. Spec. ¶ 1.

Claim 1, reproduced below from the Claims Appendix of the Appeal Brief, represents the claimed subject matter with a key limitation italicized:

1. A sinterable conductive composition comprising:
  - a metal component having an average particle diameter of greater than about 150 nm to about 100  $\mu$ m, said metal component being made from or doped with silver, aluminum, gold, germanium or oxides or alloys thereof;
  - a sintering agent; and
  - an emulsion comprising water, and at least one particulate polymer having an average particle diameter wherein *a ratio of average metal component particle diameter to average particulate polymer particle diameter is between 1:1 and 10:1.*

#### REFERENCES

The Examiner relies on the following prior art in rejecting the claims on appeal:

Name	Reference	Date
Barnes	US 2,647,107	July 28, 1953
Foreman et al. ("Foreman")	US 2012/0061623 A1	Mar. 15, 2012
Magdassi et al. ("Magdassi")	US 2012/0168684 A1	July 5, 2012
Jablonski et al.	US 8,673,049 B2	Mar. 18, 2014

("Jablonski")		
Akagawa et al. ("Akagawa")	US 2015/0217409 A1	Aug. 6, 2015

### REJECTIONS

The Examiner maintains the following rejections of claims under 35 U.S.C. § 103, as modified in the Advisory Action:

- A. Claims 1–3, 5, 6, 9–15, and 28 over Magdassi in view of Jablonski;
- B. Claims 7, 8, and 32 over Magdassi in view of Jablonski, further in view of Barnes;
- C. Claims 20–25 over Magdassi in view of Jablonski, further in view of Akagawa;
- D. Claims 26 and 33 over Magdassi in view of Jablonski and Foreman; and
- E. Claims 29 and 30 over Magdassi in view of Jablonski and Barnes.

Adv. Act. 2–3; Ans. 3.

### DISCUSSION

The Examiner bears the initial burden, on review of the prior art or on any other ground, of presenting a prima facie case of unpatentability. *Ex parte Frye*, 94 USPQ2d 1072, 1075 (BPAI 2010) (precedential) (citing *In re Oetiker*, 977 F.2d 1443, 1445 (Fed. Cir. 1992)); *In re Piasecki*, 745 F.2d 1468, 1472 (Fed. Cir. 1984) (the initial burden is on the PTO to set forth the basis for any rejection so as to put the patent applicant on notice of the reasons why the applicant is not entitled to a patent on the claim scope that they seek). To establish a prima facie case of obviousness, the Examiner

must show that each and every limitation of the claim is described or suggested by the prior art or would have been obvious based on the knowledge of those of ordinary skill in the art or the inferences and creative steps a person of ordinary skill in the art would have employed. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 417 (2007); *In re Fine*, 837 F.2d 1071, 1074 (Fed. Cir. 1988).

We focus on the Examiner's findings and determinations that relate to Appellant's contention that the combination of Magdassi and Jablonski do not teach the claimed particle diameter ratio. *See* Appeal Br. 6; Reply Br. 2–3. Because we decide this appeal based on a limitation recited by each of independent claims 1, 26, and 29, we focus our analysis on claim 1. Our analysis is equally applicable to each of the independent claims and, therefore, to all of the dependent claims as well.

The Examiner finds that Magdassi teaches a sinterable conductive composition comprising a metal component having an average particle diameter overlapping the claimed range of about 150 nanometers to 100 micrometers, said metal component being made of silver or gold or an alloy thereof. Ans. 3. The Examiner finds that Jablonski teaches a sinterable conductive composition comprising metal particles, an acid component to act as a sintering promoter, and an aqueous solvent comprising an emulsion in which resin fine particles of a polymerized vinyl-group containing monomer are dispersed to improve adhesion of the composition. *Id.* at 4. The Examiner finds that one of ordinary skill in the art would have understood the term “fine particles” in Jablonski to mean a nano-sized particle size, on the order of nanometers. *Id.* The Examiner finds that claim 1's requirement that “a ratio of average metal component particle diameter

to average particulate polymer particle diameter is between 1:1 and 10:1” means that “the claimed average particle diameter ranges of the particulate polymer as *about 15 nm to 100 μm* implied by instant claim 1.” *Id.*

The Examiner concludes that it would have been obvious to the ordinarily skilled artisan to provide the aqueous polymer emulsion taught by Jablonski in the aqueous composition of Magdassi in order to obtain a sinterable conductive composition having an improved adhesion for disposition on a substrate. *Id.* In the alternative, the Examiner determines that it would have been obvious for the ordinarily skilled artisan to vary or optimize the polymer particle size of Jablonski’s “fine particles” in order to sufficiently disperse the polymer particles and obtain an emulsion suitable to improve adhesion of the composition and silver particles to a base material. *Id.*

Appellant contends that it surprisingly discovered that the polymer emulsion as claimed improves electrical conductivity, but only when the polymer particles are within a specific range of relative particle size with respect to the metal particles. Appeal Br. 4–5. Appellant argues, “neither Magdassi nor Jablonski teach or suggest the claimed particle size relationship among the metal particles of the metal component and the particulate polymer particles of the emulsion,” i.e., a ratio of average metal component particle diameter to average particulate polymer diameter is between 1:1 and 10:1. *Id.* at 6.

We agree with Appellant that the claimed ratio is not taught or suggested by the cited art.

Claim 1 recites “a ratio of average metal component particle diameter to average particulate polymer particle diameter is between 1:1 and 10:1.”

Appeal Br. 13 (Claims App.). Thus, claim 1 requires a specific relationship between the particle size of the metal component and of the polymer particle, and not merely a size range for the polymer particle. As the Examiner acknowledges, Magdassi does not disclose a particulate polymer. *See* Final Act. 5. Jablonski teaches a composition may include a polymer obtained by polymerizing a monomer having a vinyl group, and the polymer “may be a water-soluble polymer which can be directly dissolved in a solvent, latex which is a system (emulsion) in which resin fine particles are dispersed in an aqueous solvent, or the like.” Jablonski, col. 6, ll. 62–67. Jablonski does not further characterize the size of the polymer particle, nor suggest a relationship between the polymer particle size and metal particle size. Jablonski discloses that the diameter of silver nanoparticles in the invention is equal to or less than 100 nm, preferably equal to or less than 50 nm. *Id.*, col. 5, ll. 27–29.

Missing from the record is any evidence of an interdependent relationship between the diameter sizes of the metal component and the polymer particle. In addition, nothing in the combined references suggests or recognizes that the claimed ratio relationship is a result effective variable. *See In re Antonie*, 559 F.2d 618, 620 (CCPA 1977) (a particular parameter must first be recognized as a result-effective variable, i.e., a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation). Thus, it would not have been obvious to one of ordinary skill in the art to vary or optimize the polymer particle size based on the size of the metal particles.

We “cannot accept general conclusions about what is ‘basic knowledge’ or ‘common sense’ as a replacement for documentary evidence for core factual findings in a determination of patentability.” *K/S Himpf v. Hear-Wear Techs., LLC*, 751 F.3d 1362, 1366 (Fed. Cir. 2014) (citing *In re Zurko*, 258 F.3d 1379, 1385–86 (Fed. Cir. 2001)). When the references cited by the Examiner fail to establish a prima facie case of obviousness, the rejection is improper and will be overturned. *Fine*, 837 F.2d at 1074. Here, the Examiner fails to demonstrate that each and every limitation of claim 1 is described or suggested by the prior art or would have been obvious based on the knowledge of those of ordinary skill in the art or the inferences and creative steps a person of ordinary skill in the art would have employed. *See KSR*, 550 U.S. at 417. Therefore, we do not sustain the rejection of claim 1 over Magdassi in view of Jablonski. For the same reasons, we do not sustain the rejection of claims 2, 3, 5, 6, 9–15, and 28 over these references. The additional references cited in the other rejections do not cure the deficiency in the combination of Magdassi and Jablonski, therefore we do not sustain the rejections of claims 7, 8, 20–26, 29, 30, 32, and 33.

Because the Examiner did not present a prima facie case of obviousness, we do not reach Appellants’ evidence of unexpected results.

#### DECISION SUMMARY

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, 5, 6, 9–15, 28	103	Magdassi, Jablonski		1–3, 5, 6, 9–15, 28
7, 8, 32	103	Magdassi, Jablonski, Barner		7, 8, 32



<b>Claims Rejected</b>	<b>35 U.S.C. §</b>	<b>Reference(s)/Basis</b>	<b>Affirmed</b>	<b>Reversed</b>
20–25	103	Magdassi, Jablonski, Akagawa		20–25
26, 33	103	Magdassi, Jablonski, Foreman		26, 33
29, 30	103	Magdassi, Jablonski, Barner		29, 30
<b>Overall Outcome</b>				1–3, 5–15, 20–26, 28–30, 32, 33

REVERSED