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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte BHAKTAVACHALAM THIYAGARAJAN,
WEI GUO, and NANDU DEORKAR

Appeal 2019-006969
Application 14/115,238
Technology Center 1700

Before MICHAEL P. COLAIANNI, GEORGE C. BEST, and DEBRA L. DENNETT, *Administrative Patent Judges*.

COLAIANNI, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellant[1] appeals under 35 U.S.C. § 134(a) the final rejection of claims 1, 4, 6–8, 10, and 13. Claims 14–23 are withdrawn. We have jurisdiction over the appeal pursuant to 35 U.S.C. § 6(b).

We AFFIRM.

[1] 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 Avantor Performance Materials, LLC (Appeal Br. 3).

STATEMENT OF THE CASE

Appellant's invention is directed to the preparation of chromatographic media for the purpose of separation and purification of biomolecules, particularly antibodies (Spec. 1). The Specification describes that the chromatographic media is based on allylamine and polyallylamine as the major ligand (*id.*). According to the Specification, these major ligands are modified with different functional groups to prepare ion exchange, hydrophobic, and other functional chromatographic media (*id.*).

Claim 1 is illustrative (emphasis added):

> 1. Chromatographic media comprising *porous media particles*[]*derivatized with allyamine [sic] or polyallylamine on a surface of the porous media particles*, wherein said porous media particles comprise particles selected from the group consisting of epoxidized polyacrylates, haloalkylated polyacrylates, epoxidized polymethacrylates, and haloalkylated polymethacrylates, and said allylamine or polyallylamine has a molecular weight less than 25,000.

Appellant appeals the following rejection:

> 1. Claims 1, 4, 6–8, 10, and 13 are rejected under 35 U.S.C. § 103(a) as unpatentable over Deorkar et al. (US 2008/0203029 A1; published Aug. 28, 2008, "Deorkar") in view of S. Rokushika et al., *Polyallylamine-coated silica gel microbore column for liquid chromatography*, 332 J. Chromatography, 15–18 (1985) ("Rokushika"), as evidenced by S. Shechter et al., *Glycidyl Ether Reactions with Amines*, 48 Indus. & Eng'g Chem., 94–97 (1956) ("Shechter") and Wikipedia, *Amine alkylation*, available at https://en.wikipedia.org/wiki/Amine_alkylation ("*Amine alkylation*") (Final Act. 2–4).

Appellant argues claims 1, 4, 6–8, 10, and 13 as a group (*see generally* Appeal Br. 3–12). We select claim 1 as representative. 37 C.F.R. § 41.37(c)(1)(iv). Accordingly, claims 4, 6–8, 10, and 13 will stand or fall with our analysis of independent claim 1.

FINDINGS OF FACT & ANALYSIS

The Examiner finds, *inter alia*, that Deorkar's polymeric chromatographic media comprises porous polymeric resin particles formed from epoxidized or halogenated polyacrylates or polymethacrylates (Final Act. 3). The Examiner finds that Deorkar's chromatographic media is made suitable for the purification of biomolecules by derivatizing the particles with a polymer of polyethyleneimine and then functionalizing the derivatized surface (*id.*). The Examiner finds that the resulting mixed mode media teaches each component of the subject matter of claim 1, with the exception that Deorkar does not disclose that the surface of the particles is derivatized with allylamine or polyallylamine (*id.*).

The Examiner finds that Rokushika teaches or suggests the remaining component missing from Deorkar (*id.* at 3–4). Specifically, the Examiner finds that Rokushika teaches polyallylamine as an alternative to polyethyleneimine on amine or imine derivatized packing material for liquid chromatography (*id.* at 3). The Examiner finds Rokushika teaches that a "[polyallylamine-]derivatized substrate was easy to prepare, will similarly be useful for the separation of isomeric phenolic compounds, and that the packing material was stable for more than three weeks with carbonate eluents" (*id.* at 3–4).

The Examiner determines that it would have been obvious to a person of ordinary skill in the art at the time of the invention to have substituted the polyethyleneimine on Deorkar's substrate with Rokushika's polyallylamine having a molecular weight of 8,500–11,000 because polyallylamine is a recognized substitute for polyethyleneimine in chromatography packing materials (*id.* at 4). The Examiner finds that the ordinarily skilled artisan would have also been motivated to make this substitution because polyallylamine and polyethyleneimine "offer[] similar separation capabilities . . . and stability in basic conditions" (*id.* at 4).

Appellant argues that the Examiner has not established a prima facie case of obviousness because Deorkar "teaches away from the use of silica-based chromatography packings," but Rokushika "exclusively deals with silica-based chromatography packings" (Appeal Br. 9; *see generally id.* at 9–11).

Appellant's arguments are not persuasive.

Teaching away requires that a reference "criticize, discredit, or otherwise discourage the solution claimed" by Appellant. *In re Fulton*, 391 F.3d 1195, 1201 (Fed. Cir. 2004). Here, we find that Deorkar does not teach away from the claimed subject matter because Appellant has not identified any disclosure that disparages substituting polyethyleneimine on Deorkar's substrate with polyallylamine. The Examiner, furthermore, does not propose substituting Deorkar's support material with Rokushika's silica-based chromatography packings.

Appellant argues that that the rejection of claim 1 as obvious over Deorkar and Rokushika relies on conclusory statements without regard to the underlying unpredictable chemistry (*see* Appeal Br. 9). According to

Appellant, "the mechanism of action in Rokushika (attachment via ionic bonding) is . . . wholly different than that of the presently claimed invention" (*id.* at 10). Appellant argues that Rokushika's alleged teaching that polyallylamine and polyethyleneimine are interchangeable would not have extended to non-silica particles (*id.* at 10–11).

We, however, agree with the Examiner that Appellant's arguments incorrectly imports Rokushika's bonding mechanism between a polyallylamine functional group and a silica particle into Deorkar's polymeric particle (Ans. 7). Appellant's arguments thus unpersuasively attempt to bodily incorporate Rokushika's features, which are not required for the Examiner's proposed modification, into Deorkar's structure. Appellant has not addressed or rebutted the evidence provided by *Amine alkylation* or Shechter, which both support that it was conventionally known what the bonding mechanisms are between epoxy or haloalkyl groups and: (i) secondary amines, such as polyethyleneimine, and (ii) primary amines, such as polyallylamine (Ans. 7; Reply Br. 1–3). Therefore, Appellant has not identified reversible error in the Examiner's findings that Deorkar, in view of Rokushika, renders obvious each component and limitation of the chromatographic media recited in claim 1.

When the Examiner establishes a prima facie case of obviousness, "[t]he burden then shifts to the applicant, who then can present arguments and/or data to show that what appears to be obvious, is not in fact that, when the invention is looked at as a whole." *In re Dillon*, 919 F.2d 688, 696 (Fed. Cir. 1990) (en banc). Thus, "the burden of showing unexpected results rests on [the party] . . . who asserts them." *In re Klosak*, 455 F.2d 1077, 1080 (CCPA 1972).

For the reasons set forth in the Examiner's Answer (Ans. 7–8), Appellant has not met their burden of showing unexpected results (*see* Appeal Br. 11–12; Reply Br. 3). Rather, Appellant presents attorney argument unsupported by evidence that the claimed subject matter is "completely different and unique in chemistry and performance than known art" (Appeal Br. 11). Therefore, Appellant's arguments do not rebut the Examiner's established prima facie case of obviousness.

Thus, based on this record, we sustain the Examiner's § 103(a) rejection.

CONCLUSION

In summary:

Claims Rejected	35 U.S.C. §	Reference(s)/Basis	Affirmed	Reversed
1, 4, 6–8, 10, 13	103(a)	Deorkar, Rokushika, *Amine alkylation*, Shechter	1, 4, 6–8, 10, 13	

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