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EXAMINER
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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte JUNPING ZHANG and DOREEN C. LYNCH

Appeal 2015-005963
Application 13/439,983
Technology Center 1700

Before JEFFREY T. SMITH, KAREN M. HASTINGS, and MICHAEL P. COLAIANNI, *Administrative Patent Judges*.

HASTINGS, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Appellants seek our review under 35 U.S.C. § 134(a) of the Examiner's decision rejecting claims 5–7, 9, 11, 12, and 14–19. We have jurisdiction over the appeal under 35 U.S.C. § 6(b).

We AFFIRM.

Independent claim 5 reads (emphasis added to highlight disputed limitations)[1]:

> 5. A method comprising:
>
> providing at least one first composition comprising at least one first reducible metal ion, and
>
> reducing the at least one first reducible metal ion to at least one first metal nanowire in the presence of at least one bromide ion and at least one chloride ion,
>
> *wherein the at least one chloride ion is provided by at least one first compound represented by* $NH_nR_{4-n}Cl$*, where n is 0, 1, 2, 3, or 4, or the at least one bromide ion is provided by at least one second compound represented by* $NH_nR_{4-m}Br$*, where m is 0, 1, 2, 3, or 4.*

Appellants request review of the Examiner's rejection of claims 5–7, 9, 11, 12, and 14–19 under 35 U.S.C. § 103(a) as unpatentable over Wang et al. (US 2009/0196788 A1, published August 6, 2009) ("Wang") and Nishikubo et al. (JP 2008-231564 A, published October 2, 2008 and relying on a machine translation dated February 11, 2013) ("Nishikubo"). App. Br. 2; Final Act. 2.

Appellants do not argue any claims separate from the other. App. Br. 2. Accordingly, we select independent claim 5 as representative of the subject matter before us on appeal. Claims 6, 7, 9, 11, 12, and 14–19 stand or fall with claim 5.

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[1] We note that independent claim 5 does not define element R in the formulae listed. For the purposes of this opinion, we use Appellants' description of R as representing alkyl or substituted alkyl groups, each of which may be independently selected from the others. Spec. 8.

ANALYSIS

We have thoroughly reviewed each of Appellants' arguments for patentability. However, we determine that a preponderance of the evidence supports the Examiner's § 103 rejection of representative independent claim 5. Accordingly, we will sustain all of the Examiner's rejections for essentially those reasons expressed in the Answer and we add the following for emphasis.

Independent claim 5 requires the presence of at least one chloride ion and at least one bromide ion in a nanowire production process where at least one of the recited halide ions is provided by a compound from one of the claimed formulae.

We refer to the Examiner's Final Action for a statement of the rejection. Final Act. 2–3.

Appellants argue the role of halides in metal nanowire synthesis is unpredictable. In support of this assertion, Appellants principally point to the reference to Wiley[2] as disclosing that it is unclear how bromides and chlorides impact the formation of nanostructures. App. Br. 6–7; Wiley 1068, 1070, 1071. Thus, Appellants argue one of ordinary skill in the art would not be motivated to modify the nanowire production process of Wang with the spherical particle promoting compounds of Nishikubo because substitution of one source of halides for another could not have led to the claimed invention with expected success in view of the lack of predictability of this area of art. App. Br. 4–5, 7–8; Wang ¶¶ 32, 55; Nishikubo ¶¶ 7, 15.

[2] Wiley et al., *Synthesis of Silver Nanostructures with Controlled Shapes and Properties*, 40 Acc. Chem. Res. 1067–1076 (2007) ("Wiley").

We are unpersuaded by Appellants' arguments. The Examiner found Wang discloses a method for reducing a silver compound comprising a silver ion to a silver nanowire in the presence of a bromide ion and a chloride ion (halide ions). Final Act. 2; Wang Abstract, ¶¶ 50, 72–89, 138–144 and 170–186. The Examiner found that Wang does not disclose the halide ion sources to include the claimed ammonium chloride or ammonium bromide compounds. Final Act. 2. To remedy this difference, the Examiner relies on Nishikubo as teaching the use of ammonium bromide and ammonium chloride compounds as halide sources in a metal reducing process. Final Act. 3; Nishikubo ¶ 8. The Examiner determined it would have been obvious to one of ordinary skill in the art to use the ammonium bromide and ammonium chloride compounds of Nishikubo as halide ion sources for the process of Wang, with expected success, because they are conventional materials being used to perform their known functions in a conventional process. Final Act 3. Thus, the Examiner provided a reasonable basis why one skilled in the art would have modified the nanowire production process of Wang by using the halide ion sources of Nishikubo. That is, the Examiner determined that one of ordinary skill in the art would have been led to the known halide sources of Nishikubo with the reasonable expectation of using them in successfully making metal nanowire structures in the process of Wang. *See KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 416 (2007) ("[W]hen a patent claims a structure [or method] already known in the prior art that is altered by the mere substitution of one element [or step] for another known in the field, the combination must do more than yield a predictable result." (citing *United States v. Adams*, 383 U.S. 39, 50–51 (1966)); *In re Fout*, 675 F.2d 297, 301

(CCPA 1982) ("Express suggestion to substitute one equivalent for another need not be present to render such substitution obvious."); *In re Mayne*, 104 F.3d 1339, 1340 (Fed. Cir. 1997) ("Because the applicants merely substituted one element known in the art for a known equivalent, this court affirms [the rejection for obviousness]."). Moreover, Wiley's disclosure that the role of the chloride and bromine ions is not completely understood is insufficient to establish the unpredictability in the art asserted by Appellants. App. Br. 6–8; Wiley 1070–1071. On the contrary, this reference, provided by Appellants, shows one skilled in the art is capable of manipulating process conditions to predictably obtain a specifically desired nanostructure. *See for example*, Wiley 1069 (first paragraph of *Single-Crystal Nanocubes and Cuboctahedra* section).

Thus, on this record, Appellants have not adequately explained why one skilled in the art would not have been capable of adapting the method of Wang to use the halide ion sources of Nishikubo for the production of nanowire structures.

Accordingly, we affirm the Examiner's prior art rejection of claims 5–7, 9, 11, 12, and 14–19 under 35 U.S.C. § 103(a) for the reasons presented by the Examiner and given above.

ORDER

The Examiner's prior art rejection under 35 U.S.C. § 103(a) is affirmed.

TIME PERIOD

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).

AFFIRMED