

The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.

Paper No. 19

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte
YONGCHI TIAN

Appeal No. 2001-2124
Application No. 09/416,914

ON BRIEF

Before LIEBERMAN, DELMENDO and MOORE, Administrative Patent Judges.

LIEBERMAN, Administrative Patent Judge.

DECISION ON APPEAL

This is an appeal under 35 U.S.C. § 134 from the decision of the examiner refusing to allow claims 1 through 17 which are all the claims pending in this application.

THE INVENTION

The invention is directed to a method for coating inorganic particles. These particles have a particle size of about 1 to 100 micrometers. The coating particles have a particle size of about 1 to 100 nanometers, corresponding to 0.001 micrometers to 0.1 micrometers, which surrounds the inorganic particles. The mixture is thereafter fired, separated from uncoated inorganic particles and dried. Additional limitations are described in the following illustrative claims.

THE CLAIMS

Claims 1, 8, 14 and 17 are illustrative of the appellant's invention and are reproduced below.

1. A method of coating inorganic particles comprising mixing inorganic particles having a particle size of about 1 to 100 micrometers with a sufficient amount of coating particles having a particle size of about 1 to 100 nanometers to surround said inorganic particles,

firing the mixture at a temperature high enough to soften or melt the coating particles, thereby encapsulating the micrometer-sized particles, but at a temperature low enough so that the surface properties of the micrometer-sized particles remain unchanged,

separating out any uncoated micrometer-sized particles by reacting or dissolving them in a solvent, and

drying the coated particles.

6. A method according to claim 5 wherein the phosphor is a europium activated strontium sulfide phosphor.

8. A method according to claim 6 wherein the phosphor is a europium activated calcium

sulfide phosphor.

14. A method of coating inorganic particles comprising:
dry mixing inorganic particles having a particle size of about 1 to 100 micrometers with coating particles having a particle size of about 1 to 100 nanometers, and

firing the mixture at a temperature high enough to soften or melt the nanometer-sized coating particles.

17. A method for coating inorganic particles comprising:

dry mixing MS: Eu phosphor particles where M is a calcium or strontium having a particle size of from 1 to 100 micrometers with silica particles having a particle size of 2 to 50 nanometers; and

firing the mixture of phosphor particles and silica particles to a temperature of at least the softening point for said silica particles.

THE REFERENCES OF RECORD

As evidence of obviousness, the examiner relies upon the following references:

Lehmann	3,617,332	Nov. 2, 1971
Schulze	4,684,540	Aug. 4, 1987
Hase et al. (Hase)	4,874,985	Oct. 17, 1989
Aihara et al. (Aihara)	5,330,791	Jul. 19, 1994
Umeya et al. (Umeya)	5,489,449	Feb. 6, 1996

THE REJECTIONS¹

Claim 14 stands rejected under 35 U.S. § 102 (b) as anticipated by Umeya.

Claims 1 through 6 and 9 through 12 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Schulze in view of Aihara and Hase.

Claims 7 and 8 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Schulze in view of Aihara and Hase and further in view of Lehmann.

Claims 13 through 16 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Schulze in view of Aihara and Hase.

Claims 17 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Schulze in view of Aihara and Hase and further in view of Lehmann.

OPINION

We have carefully considered all of the arguments advanced by the appellant and the examiner, and agree with the examiner that the rejections of claims 1 through 12 and 14 under §§ 102(b) and 103(a) are well founded. Accordingly, we affirm the rejections for the reasons set forth in the Answer and as discussed herein. We agree with the appellant that

¹A rejection under 35 U.S.C. § 112, second paragraph has been withdrawn by the examiner.

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the rejections of claims 13 and 15 through 17 under 35 U.S.C. § 103(a) are not well founded. Accordingly, we reverse these rejections.

As an initial matter, it is the appellant's position that, "[c]laims 1-13 should be considered together." Claims 14 through 17 are to be considered separately. See Brief, page 4. As noted in our Remand To The Examiner, however, "each of the rejections will be considered separately. However, the patentability of individual claims within each group of rejected claims will not be considered." See Remand To The Examiner, page 3. Accordingly, we select claims 1, 8, 13, 14 and 17 as representative of the claimed subject matter and limit our consideration thereto. See 37 CFR §1.192(c)(7) (2000).

The Rejection under §102(b)

It is the appellant's position that Umeya fails to anticipate claim 14 as Umeya, "teach mixing the same size core particles with particles called 'ultrafines' that are 0.005 to 0.5 microns in size. These 'ultrafines' are much larger than the nanometer size particles required by claim 14." See Brief, page 5. We disagree with the appellant's conclusion.

Umeya is directed to coated particles of inorganic materials. See column 1, lines 12-17 and 59-62. We find that the ultrafines of the inorganic material are combined with core particles in a vapor phase. See column 2, lines 1-5 and each of the examples. It is evident that no water is present in the combination and we conclude that the particles are mixed while dry. Umeya teaches that "particles of the core material have usually an average

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particle size in the range of 0.1 μm to 100 μm , preferably 1 μm to 10 μm .” See column 2, lines 50-52. We conclude that, the preferred range of core particle, 1 μm to 10 μm , anticipates the particle size of “about 1 to 100 micrometers” required by the claimed subject matter.

As to the particle size of the ultrafines, the appellant has correctly stated that Umeya teaches an ultrafine having an average particle size in the range of 0.005 μm to 0.5 μm . See column 2, lines 67-68. This size corresponds to 5 nm to 500 nm. We find, however, that Umeya further discloses that the particle size of the ultrafines is “usually 0.1 μm which corresponds to 100 nm and is within the scope of the claimed subject matter.” We further find that Example 2 discloses core particles having an average particle size of 1 μm coated with an ultrafine having an average particle size of 0.02 μm corresponding to 20 nanometers. We find that, Examples 3 and 4 disclose core particles having a particle size of 40-60 μm coated with ultrafines having a particle size of 0.01 to 0.05 μm , corresponding to 10 to 50 nm. Each of the aforementioned examples teaches both core particle size and ultrafine particle size within the scope of the claimed subject matter.

Based upon the above findings, we conclude that the teachings and disclosure of Umeya are sufficient to establish a *prima facie* case of anticipation with respect to claim 14.

The Rejection under § 103(a) of claims 1-6 and 9-12

With respect to the rejection over Schultze in view of Aihara and Hase, we adopt the examiner's position as stated in the Answer, pages 4 through 6, it being the examiner's position that Schultze discloses and teaches the method of claim 1 other than the particle size of the core particles and the coating particles.

Schulze is directed to a coated pigmented phosphor and to a method for its preparation. See column 1, lines 7-9. In addition to its disclosure of the claimed process as found by the examiner, Schulze discloses heating the resulting dried phosphor at a temperature of from 400° C to about 550° C for periods of about 2 hours to dehydrate a silicate coating atop the phosphor and form a water insoluble glassy film silicate coating on the pigmented phosphor. See column 3, lines 38-43 and Examples 1 through 3 which teach heating for about 2 hours. The claimed subject matter requires "firing the mixture at a temperature high enough to soften or melt the coating particles." This limitation is expressly disclosed in the specification at page 6, lines 5-14. The very next paragraph beginning in the specification page 6, line 15 states that "[f]or forming a silica layer on phosphor powders, firing can be carried out at a temperature of from about 500 to about 1100° C for from about 20 to 120 minutes." The teachings of Schulze, with respect to heating the silicate coated phosphor, overlap that portion of the temperature range disclosed in the specification between about 500 and about 550° C. We further find that Schulze utilizes both the lower end of the temperature range, and the upper end of the time required to affect the changes in

the coating, i.e., about 2 hours or 120 minutes. Accordingly, we conclude that Schulze meets the requirement of the claimed subject matter in that patentee coats a pigmented phosphor with silica for both a period of time, which falls within that disclosed in the specification and at temperatures overlapping those of the claimed subject matter.

As for the particle size of the core particles and the silica coating, the examiner relies upon two secondary references to Aihara and Hase each of which are directed to embodiments likewise containing a pigmented phosphor. Aihara discloses the addition of pigment which is attached to the phosphor. See column 5, lines 17-34. The pigmented phosphor is thereafter coated with colloidal silica disclosed among a limited number of other coating agents and having a grain size of 50 nm or less. See column 4, lines 33-42 and line 67 to column 5, line 16. Aihara specifically discloses that, “[i]f the grain size of a powder exceed 50 nm, dispersability of a phosphor tends to be degraded. Therefore, a powder having a grain size of 50 nm or less is preferably selected.” *Id.* We conclude, therefrom, that it would have been obvious to one of ordinary skill in the art to have chosen a silica coating having a particle size of 50 nm or less to coat the pigmented phosphor of Schulze.

Hase is also directed to embodiments including pigmented phosphors. See column 15, lines 3-12 and column 18, lines 7-17 and claim 2, among other disclosures. Hase discloses in the background of the invention, that phosphor grains having a median grain size in a range of about 6 to 12 microns are generally utilized for the phosphor particles. See column 3,

lines 15-20. The phosphors utilized by Hase in one embodiment have grain size in the range of several microns to several tens of microns. See column 17, lines 48-52. Among the examples wherein grain size of the phosphor is disclosed, we find a grain size of 8 microns, Example 9; 9 microns, Example 12; 8 microns, Example 13; and 9 microns, Example 14.

Based upon the above considerations, we further conclude, that the examiner has established a *prima facie* case of obviousness against the claimed subject matter. In our view, the prior art would have suggested to those of ordinary skill in the art to have chosen a phosphor particle having a particle size within the scope of the claimed subject matter, i.e., 1 to 100 microns as the pigmented phosphor of Schulze, because these sizes are the usual and customary sizes utilized in the preparation of pigmented phosphor particles. Furthermore, as each of the references is directed to a pigmented phosphor, there are both ample motivation and a reasonable chance of success in choosing the particle size disclosed by Aihara and Hase respectively. We further conclude, that the prior art has revealed that in so making or carrying out, those of ordinary skill in the art would have had a reasonable expectation of success. See *In re Vaeck*, 947 F.2d 488, 493, 20 USPQ2d 1438, 1442 (Fed. Cir. 1991).

Accordingly, the teachings and disclosure of the combined references of Schulze, Aihara and Hase are sufficient to establish a *prima facie* case of obviousness with respect to claims 1-6 and 9-12.

The Rejection under § 103(a) of claims 7 and 8

We shall also affirm the rejection of claims 7 and 8 as further relying upon a reference to Lehmann. Lehmann discloses a europium activated calcium sulfide phosphor. See column 2, lines 14-15 and claim 6. Lehmann discloses in column 1, lines 24-27 that “[f]or cathodoluminescent applications, the energy efficiencies of the alkaline-earth metal sulfide phosphors are equal to the best efficiency levels obtained with other types of phosphors, such as zinc sulfide.” Inasmuch as Schulze teaches and discloses the utilization of zinc sulfide phosphors, column 2, line 4 and Example 3, it would have been obvious to one of ordinary skill in the art to have substituted the alkaline earth metal sulfide phosphors for zinc sulfide phosphors. Inasmuch as the appellant arguments are the same as those presented with respect to the previous rejection, which arguments have been responded to in our analysis, we conclude that the examiner has established a *prima facie* case of obviousness against the claimed subject matter.

The Rejection under § 103(a) of claims 13-17

We shall not sustain the balance of the rejections of claims 13 through 17. Each of the claims before us requires “dry mixing” inorganic particles with coating particles. The examiner relies upon the disclosure of Schulze at column 3, lines as providing basis for, “some dry mixing of the phosphor and coating particles.” See Answer, page 8. We find that Schulze teaches: “[I]t is preferred to dry the mixture with agitation to prevent agglomeration of the phosphor while the mixture is in the blender dryer. The drying is done preferably by

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first heating at a temperature of about 100° C. for a sufficient time with agitation to remove the water. . . . The resulting dried phosphor is then heated.” It is a matter of speculation whether any mixing occurs following drying of the mixture. In the absence of a teaching or suggestion that dry mixing actually occurs, we conclude that the mixing step disclosed by Schulze is insufficient to meet the process limitations of the claimed subject matter.

DECISION

The rejection of claim 14 under 35 U.S. § 102 (b) as anticipated by Umeya is affirmed.

The rejection of claims 1 through 6 and 9 through 12 under 35 U.S.C. § 103(a) as being unpatentable over Schulze in view of Aihara and Hase is affirmed.

The rejection of claims 7 through 8 under 35 U.S.C. § 103(a) as being unpatentable over Schulze in view of Aihara and Hase and further in view of Lehmann is affirmed.

The rejection of claims 13 through 16 under 35 U.S.C. § 103(a) as being unpatentable over Schulze in view of Aihara and Hase is reversed.

The rejection of claim 17 under 35 U.S.C. § 103(a) as being unpatentable over Schulze in view of Aihara and Hase and further in view of Lehmann is reversed.

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The decision of the examiner is affirmed-in-part.

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

AFFIRMED-IN-PART

PAUL LIEBERMAN)	
Administrative Patent Judge)	
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)	BOARD OF PATENT
ROMULO H. DELMENDO)	APPEALS
Administrative Patent Judge)	AND
)	INTERFERENCES
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