

THIS OPINION WAS NOT WRITTEN FOR PUBLICATION

The opinion in support of the decision being entered today (1) was not written for publication in a law journal and (2) is not binding precedent of the Board.

Paper No. 17

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte JAMES KANE

Appeal No. 1996-2769
Application 08/270,089

ON BRIEF

Before JOHN D. SMITH, ELLIS and KRATZ, ***Administrative Patent Judges.***

ELLIS, ***Administrative Patent Judge.***

DECISION ON APPEAL

This is an appeal under 35 U.S.C. § 134 from the examiner's final rejection of claims 1 through 7 and 9 through 17, all the claims remaining in the application.

Claim 1 is illustrative of the subject matter on appeal and reads as follows:

1. A process for the preparation of small particles size spherical phosphor particles which comprises:

a) preparing an aqueous solution of soluble salts of a rare earth phosphor-precursor metal in amounts required to make a phosphor and an organic chemical that releases hydroxyl ions by hydrolysis;

b) precipitating rare earth hydroxycarbonate particles from said solution, said particles having a spherical shape and particle size of less than one micron;

c) collecting the rare earth hydroxycarbonate particles;

d) heating the hydroxycarbonate particles in an oxygen-containing atmosphere at a temperature in the range of about 700 to about 1000EC to form the corresponding rare earth oxide compound while maintaining the particle size and spherical shape of the hydroxycarbonate particles; and

e) heating the rare earth oxide particles in a flux composition of sulfur and one or more salts selected from the group consisting of alkali metal sulfates, phosphates and carbonates in the absence of oxygen at a temperature of no more than about 900E C to convert the oxide to the corresponding oxysulfide compound without changing the shape or the particle size of the particles.

The references relied upon by the examiner are:

Royce et al. (Royce)	3,502,590	Mar. 24, 1970
Hewes	3,541,022	Nov. 17, 1970
Matijevic	5,015,452	May 14, 1991

Kanehisa et al. (Kanehisa), "Formation Process of $Y_2O_2S:Eu^{3+}$ in a Preparation with Flux," ***J. Electrochem. Soc. Solid-Sci. and Technology***, Vol. 132, No. 8, pp. 2023-27 (Aug. 1985).

Beverloo et al. (Beverloo), "Inorganic Phosphors and New Luminescent Labels for Immunocytochemistry and Time-Resolved Microscopy," ***Cytometry***, Vol. 11, pp. 784-92 (1990).

Claims 1 through 7 and 9 through 17 stand rejected under 35 U.S.C. § 103 as being unpatentable over Royce in view of Hewes, Matijevic, Kanehisa and Beverloo.

We **reverse**.

The appellant's invention is directed to a method of making improved phosphors having a uniform, spherical shape and particle size below one micron. According to the specification

Phosphors typically comprise one or more rare earth metals in a host material. Up-converter phosphors emit light in the visible wavelength radiation range (550-800 nanometers) when excited by long wavelength radiation, e.g., light in the infrared wavelength spectrum. This is accomplished by multiple absorption of infrared photons and energy transfer between the absorbing and the emitting ions. For example, it is known that yttrium oxysulfide, Y_2O_2S , gadolinium oxysulfide, Gd_2O_2S , and lanthanum oxysulfide La_2O_2S , doped with certain activator couples, will be excited by 0.96 micron wavelength radiation. Such radiation can be provided by semiconductor lasers [specification , p. 1].

The phosphors of the present invention are said to be useful in biological assays for detecting compounds such as proteins, drugs, and polynucleotides. Specification, p. 1. The specification indicates that the phosphors "can be used as immunoassay labels by attaching them to one or more probes, such as antibodies, protein A, polypeptide ligands of cellular receptors, polynucleotides, drugs, antigens, toxins and the like." *Id.*, p. 2.

The examiner's findings of fact and conclusion(s) of obviousness were set forth in the Answer as follows. The examiner first applied Royce, a patent which was said to disclose a process of heating a "mixture of rare earth oxides and a flux of sulfur and at least one alkali metal salt at a temperature of 700-1250EC in the absence of oxygen," as the primary reference. Answer, p. 4. The examiner acknowledged that Royce did not teach "the specifically claimed oxysulfide nor the claimed activator couples because they

were not know [sic, known] at the time Royce et al[.] was filed.” *Id.*, last sentence. The examiner then turned to Hewes, a patent which was said to disclose a method of making the specifically claimed composition ($Y_{0.86}Yb_{0.08}Er_{0.06}O_2S$) and, thus, the broadly claimed composition, in a sulfur-containing atmosphere. *Id.*, p. 5. According to the examiner, Hewes also “teaches that a mixed rare earth oxide formed by coprecipitating can to converted to oxysulfides.” The examiner concluded that it would have been obvious to one of ordinary skill in the art “to produce the oxysulfide compounds of Hewes by the method of Royce et al[.], where the oxide is produced by coprecipitation for the reasons given in Royce et al. Thus, the combination suggests producing rare earth activator couple [sic, couples] containing rare earth oxysulfides by coprecipitating a Yb, Er and one of La, Y or Gd oxalate, converting the oxalate to an oxide by heating it in air at 800-1200EC [Hewes: col. 3, lines 38-45] and then converting the oxide to an oxysulfide by the method of Royce et al.” *Id.*

The examiner states that the combination of Royce and Hewes is lacking in that the patents “do not teach nor suggest the claimed method of producing the taught precursor oxides of Hewes which are treated by the process of Royce et al[.], nor is there any teaching nor suggestion of the phosphors having the claimed morphology.” *Id.* To that end, the examiner argues that Matijevic discloses “a process from [sic, for] producing colloidal, uniform sized spherical rare earth oxide phosphor particles which are used as

luminescent labels in biology.” *Id.*, p. 6. The examiner points out that the method of making the particles disclosed by Matijevic is substantially the same as steps (a) - (c) of the claimed method. However, the examiner recognizes that there are two deficiencies in the Matijevic patent, *viz.*, it (i) only teaches a method of making particles comprising **single** rare earth oxides, and (ii) fails to teach the conversion of the oxides to oxysulfides. The examiner does not offer any reason as to why it would have been obvious to one of ordinary skill in the art to convert the single earth oxides disclosed by Matijevic to the corresponding oxysulfide, but she attempts to account for the first deficiency by urging that the patent “suggests to one of ordinary skill in the art to produce spherical colloidal oxides of other known activated rare earth oxides, such as $(Y_{0.86}Yb_{0.08}Er_{0.06})_2O_3$ **discussed by appellant in the specification**, by the taught process” [emphasis added]. *Id.*

This last statement underscores our principal reason for finding that the examiner has failed to establish a **prima facie** case of obviousness. We direct the examiner’s attention to the holding of the court in ***Pro-Mold & Tool Co. v. Great Lakes Plastics, Inc.***, 75 F.3d 1568, 1573, 37 USPQ2d 1626, 1629 (Fed. Cir. 1996)(citation omitted):

It is well-established that before a conclusion of obviousness may be made based on a combination of references, there must have been a reason, suggestion, or motivation to lead an inventor to combine those references.

Here, the only place where we find a teaching of a method of making **spherical** phosphor particles of **less than one micron** in size comprising a **rare earth phosphor**

and a precursor metal is in the appellant's specification. In addition, the only place where we find a suggestion to convert the referenced spherical rare earth oxide compound to the corresponding oxysulfide at a temperature no greater than 900EC is in the appellant's specification. The flaw in the examiner's reasoning is apparent from the outset when she begins with two references (Royce and Hewes) which, at best, only suggest step (e) of the claimed method. Neither Royce nor Hewes teaches the requisite steps for making spherical particles of less than one micron in size which comprise an oxide of a rare earth phosphor and precursor metal. Thus, since the references do not teach or suggest the required starting material, the disclosed methods of converting rare earth oxides to oxysulfides, even if performed at a temperature not greater than 900EC, will never result in the production of the claimed product. By beginning with references which only disclose a process similar to the final step of the appellant's method, in this case, the only way the examiner can "piece together" a rejection is by using the appellant's specification as a template and selecting additional references to fill the gaps. Thus, we agree with the appellant that the examiner has relied on impermissible hindsight in making her determination of obviousness. *In re Fritch*, 972 F.2d 1260, 1266, 23 USPQ2d 1780, 1784 (Fed. Cir. 1992)("It is impermissible to engage in hindsight reconstruction of the claimed invention, using the applicant's structure as a template and selecting elements from references to fill the gaps"); *Interconnect Planning Corp. v. Feil*, 774 F.2d 1132,

Appeal No. 1996-2769
Application 08/270,089

1138, 227 USPQ 543, 547 (Fed. Cir. 1985); *W.L. Gore & Assocs. v. Garlock, Inc.*, 721 F.2d 1540, 1553, 220 USPQ 303, 312-13 (Fed. Cir. 1983), *cert. denied*, 469 U.S. 851 (1984) (“To imbue one of ordinary skill in the art with knowledge of the invention in suit, when no prior art reference or references of record convey or suggest that knowledge, is to fall victim to the insidious effect of a hindsight syndrome wherein that which only the inventor taught is used against its teacher”).

We recognize that the examiner has relied on two additional references, Beverloo and Kanehisa, in reaching her conclusion of obviousness. However, we do not find these additional teachings bolster the examiner’s position. Contrary to the examiner’s argument, we do not find that the teachings of Beverloo of a method of making a new luminescent label by ball milling would have suggested the claimed method to one of ordinary skill in the art. Nor do we find any teachings in Beverloo which would have suggested to such persons to combine the teachings of Royce, Hewes and Matijevic to arrive at the claimed method of producing spherical particles of less than one micron in size.

As to the Kanehisa publication, we agree with the appellant that the firing of europium-activated yttrium oxysulfide do not teach or suggest the formation of spherical particles of less than one micron. To the contrary, Kanehisa discloses

... the mean particle size of Y_2O_3 is 1.5 μm , there are no grains of this size in the SEM image, which indicates that primary Y_2O_3 particles aggregate and form coagulated grains of about 8-10 μm in size. In

Appeal No. 1996-2769
Application 08/270,089

the initial state of reaction, $Y_2O_2S:Eu^{3+}$ prepared at 700EC for 2h have a size and morphology similar to those for the Y_2O_3 starting material. This same similarity was also observed in $Y_2O_2S:Eu^{3+}$ prepared at 1200EC for) min. [p. 2024, col. 2].

Accordingly, the rejection is reversed.

REVERSED

John D. Smith)
Administrative Patent Judge)
)
)
)
Joan Ellis) BOARD OF PATENT
Administrative Patent Judge) APPEALS AND
) INTERFERENCES
)
)
Peter F. Kratz)
Administrative Patent Judge)

JE/cam

Appeal No. 1996-2769
Application 08/270,089

William J. Burke
David Sarnoff Research Center, Inc.
CN 5300
Princeton, NJ 08543-5300