

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

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte JONATHAN PHILLIPS, DANIEL MENDOZA,
and CHUN-KU CHEN

Appeal 2007-0166
Application 10/195,757
Technology Center 1700

Decided: April 26, 2007

Before BRADLEY R. GARRIS, CHUNG K. PAK, and
JEFFREY T. SMITH, *Administrative Patent Judges*.

PAK, *Administrative Patent Judge*.

DECISION ON APPEAL

This is a decision on an appeal from the Examiner's final rejection of claims 1 through 12 and 17 through 22, all of the claims pending in the above-identified application. We have jurisdiction pursuant to 35 U.S.C. §§ 6 and 134.

I. APPEALED SUBJECT MATTER

The subject matter on appeal is directed to “a method for forming nanoparticles of metal oxide from microparticles of elemental metal or metal alloy (Br. 2).” According to the Appellants (Br. 2-3):

An aerosol of microparticles of metal is directed into the hot zone of a microwave-generated plasma. The microparticles vaporize in the hot zone, and the vapor is directed away from the hot zone to a cooler region where it condenses and oxidizes to form nanoparticles of metal oxide.

Details of the appealed subject matter are recited in representative claim 1, which is reproduced below:

1. A method for producing metal oxide nanoparticles, comprising the steps of:
 - (a) generating an aerosol comprising solid metallic precursor microparticles;
 - (b) generating a microwave plasma comprising oxygen and a plasma hot zone at a temperature sufficiently high to vaporize the microparticles;
 - (c) directing the aerosol into the hot zone of the microwave-generated plasma and allowing the microparticles to vaporize to vapor; and
 - (d) directing the vapor away from the plasma hot zone and into a cooler region where the vapor cools, condenses, and oxidizes to form metal oxide nanoparticles.

II. PRIOR ART

As evidence of unpatentability of the claimed subject matter, the Examiner has relied upon the following sole reference:

Yadav US 6,569,397 B1 May 27, 2003

III. REJECTION

The Examiner has rejected claims 1 through 12 and 17 through 22 under 35 U.S.C. § 103(a) as unpatentable over the disclosure of Yadav.

IV. ISSUE:

Would Yadav have taught or suggested to one of ordinary skill in the art to generate an aerosol comprising solid metallic precursor microparticles before introducing it into a microwave plasma reactor for the purpose of producing metal oxide nanoparticles?

VI. FACTUAL FINDINGS, PRINCIPLES OF LAW, AND ANALYSIS

As evidence of obviousness, the Examiner relies on the disclosure of Yadav (Answer 3). According to the Examiner (*id.*):

Yadav suggests the instantly claimed process of forming an aerosol by suspending a metal containing emulsion, i.e. solid metallic microparticles, in a gas (col. 6, lines 51-64) which is fed to a microwave plasma to vaporize the powder suspension (col. 6, line 64 to col. 7, line 10). The metal vapor is cooled and oxidized to form metal oxide nanoparticles such as aluminum oxide and magnesium oxide (col. 7, lines 15-43, example 1 and Table 2).

Yadav may differ as to the size of the microparticles, however size of an article is not a matter of invention. *In re Rose*, [220 F.2d 459, 463,] 105 USPQ 237[, 240 (CCPA 1955)].

The Appellants disagree with the Examiner's finding (Br. 6). The Appellants argue that contrary to the Examiner's finding, Yadav does not teach or suggest generating an aerosol containing solid metallic microparticles (*id.*).

The dispositive question is, therefore, whether Yadav teaches or would have suggested generating an aerosol containing solid metallic microparticles prior to introducing it into a microwave plasma reactor within the meaning of 35 U.S.C. § 103. On this record, we answer this question in the negative.

As is apparent from pages 3 and 4 and of the Answer, the Examiner assumes that Yadav's metal containing emulsion is a liquid containing metal particles, which, upon atomization or suspension in a gas, forms an aerosol containing metal particles. This assumption, however, is not supported by substantial evidence. Yadav, at column 4, lines 29-37, states that:

The precursor may be a gas, single phase liquid, *multiphase liquid*, a melt, fluid mixtures and combinations thereof. Illustration of precursors includes but does not limit to metal acetates, metal carboxylates, metal ethanoates, metal alkoxide...metal salts soluble in organics or water, and *metal containing emulsions*. [Emphasis added.]

Yadav again refers to metal containing emulsions in the context of atomizing them in a mixing apparatus or suspending them in a gas (col. 6, ll. 51-64). Yadav then exemplifies supplying emulsions containing dissolved metals (liquid form) directly into a plasma reactor or suspending them in argon or oxygen before introducing them into a plasma reactor (col. 8 to col. 11). As correctly argued by the Appellants (Br. 6-7), Yadav, as a whole, clearly

indicates that metal containing emulsions are solutions. This finding is also consistent with the plain meaning of the term “emulsion”.¹

The Examiner relies on *In re Rose*, *supra* to demonstrate that generating an aerosol having solid microparticles or any size solids would be *per se* obvious. However, the Examiner’s reliance on *Rose* is misplaced. *Rose* does not indicate that Yadav’s teaching of suspending emulsions would have led one of ordinary skill in the art to form or generate an aerosol having solid metallic microparticles.²

Under these circumstances, we concur with the Appellants that Yadav would not have taught or suggested generating an aerosol containing solid metallic microparticles for the purpose of introducing it into a microwave plasma reactor within the meaning of 35 U.S.C. § 103.

V. CONCLUSION

The decision of the Examiner is reversed.

VI. TIME

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 *Grant & Hackh’s Chemical Dictionary*, page 212 (5th Ed., McGraw-Hill Inc. 1987) defines “emulsion” as “[a] fluid containing a microscopically heterogeneous mixture of 2 normally immiscible liquid phases, in which one liquid forms minute droplets suspended in the other liquid.”

² *Rose* held that changing the size of a lumber package was ordinarily well within the ambit of one of ordinary skill in the art. However, as is apparent from *In re Antonie*, 559 F.2d 618, 620, 195 USPQ 6, 8-9 (CCPA 1977), the CCPA rejects any notion that changing sizes is *per se* obvious. *Antonie* requires that sizes be shown to be a result effective variable in order to establish a *prima facie* case of obviousness.

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REVERSED

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