

The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.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 HUI-JUNG WU and JAMES S. DRAGE

---

Appeal No. 2005-2522  
Application No. 09/841,453

---

ON BRIEF

---

Before PAK, KRATZ and MOORE, Administrative Patent Judges.  
KRATZ, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal from the examiner's final rejection of claims 2-29 and 31-34. We have jurisdiction pursuant to 35 U.S.C. § 134.

BACKGROUND

Appellants' invention relates to a nanoporous silica film and an integrated circuit comprising such a film. The claimed film is described, at least in part, by a method of preparing the same. The method requires the reaction of the film with a surface modification agent under conditions to form a hydrophobic coating on the film. The surface modification agent includes at

least one oligomer or polymer reactive with silanol groups on the silica film. According to appellants (specification, page 4), their surface modification results in a treated film with enhanced mechanical strength while achieving desirable dielectric values. Also, see page 34, Table 7 and numbered lines 9-13 of the specification. A further understanding of the invention can be derived from a reading of exemplary claim 20, which is reproduced below:

20. A nanoporous silica film produced by a process comprising the steps of reacting a suitable silica film with a composition comprising a surface modification agent, wherein said silica film is present on a substrate and wherein said reaction is conducted under conditions and for a period of time sufficient for said surface modification agent to form a hydrophobic coating on said film and said surface modification agent comprises at least one type of oligomer or polymer reactive with silanol groups on said silica film.

The prior art references of record relied upon by the examiner in rejecting the appealed claims are:

Grainger et al. (Grainger)	5,686,549	Nov. 11, 1997
Burns et al. (Burns)	5,750,610	May 12, 1998
Smirnov et al. (Kotelnikov <sup>1</sup> ) (published Russian Patent Application)	2,089,499	Sep. 10, 1997

---

<sup>1</sup> The examiner and appellants refer to this reference as Kotelnikov. Our references to Kotelnikov in this decision are to the English language translation of the published Russian patent application that is of record.

Jin et al. (Jin), EP 0 849 796 A2 Jun. 24, 1998  
(published European Patent Application)

In addition, the following U.S. patent is cited by the examiner in an obviousness-type double patenting rejection:

Rutherford et al. (Rutherford) 6,318,124 Nov. 21, 2001

Claims 2-16, 18-21 and 31-34 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Jin in view of Grainger and Kotelnikov. Claims 22-29 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the same combination of references in a separately stated rejection in the answer. Claim 17 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Jin in view of Grainger, Kotelnikov and Burns. Claims 2-29 and 31-34 stand rejected under the judicially created doctrine of obviousness-type double patenting over claims 1-19 of U.S. patent No. 6,318,124 in view of Grainger and Kotelnikov.

We refer to the brief and reply brief and to the answer for a complete exposition of the opposing viewpoints expressed by appellants and the examiner concerning the issues before us on this appeal.

#### OPINION

Having carefully considered each of appellants' arguments set forth in the briefs, appellants have not persuaded us of

reversible error on the part of the examiner. Accordingly, we will affirm the examiner's rejections of the appealed claims. Our reasoning follows.

Appellants have furnished fifteen groupings of claims (brief, pages 4-6). The examiner's Section 103(a) rejection of claims 2-16, 18-21 and 31-34 over Jin in view of Grainger and Kotelnikov includes claims within twelve of appellants' fifteen claim groupings. Notwithstanding the separate claim groupings involved, appellants do not furnish separate arguments for any of the claims subject to this ground of rejection. Accordingly, we select claim 20 as the representative claim on which we shall decide this appeal as to the examiner's Section 103(a) rejection of claims 2-16, 18-21 and 31-34 over Jin in view of Grainger and Kotelnikov. See 37 CFR § 1.192(c)(7), as in effect at the time of the filing of appellants' brief, and In re McDaniel, 293 F.3d 1379, 1383, 63 USPQ2d 1462, 1465 (Fed. Cir. 2002) ("[i]f the brief fails to meet either requirement, the Board is free to select a single claim from each group of claims subject to a common ground of rejection as representative of all claims in

that group and to decide the appeal of that rejection based solely on the selected representative claim").<sup>2</sup>

Jin discloses the formation of porous silica (hybrid organic-silica dielectric) films useful in microelectronic integrated circuit devices. Appellants do not dispute that Jin discloses a nanoporous silica film on a substrate. See, e.g., column 4, lines 29 and 30 of Jin. Rather, appellants (brief, page 6) maintain that Jin does not disclose a hydrophobic coating formed from an oligomer or polymer reactive with silanol groups of a nanoporous film, as required by representative claim 20.<sup>3</sup>

---

<sup>2</sup>Also, see new rule 37 CFR 41.37(c)(7).

<sup>3</sup> The claimed porous silica film includes silica films obtained using organic base materials (paragraph bridging pages 7 and 8 of the specification and the paragraphs under the caption "Nanoporous Silica Films," at pages 1-3 of appellants' specification). Also, representative claim 20 is a product-by-process claim. Therefore, certain principles of patent jurisprudence apply. The patentability of a product is a separate consideration from that of the process by which it is made. See In re Thorpe, 777 F.2d 695, 697, 227 USPQ 964, 966 (Fed. Cir. 1985). Moreover, determination of the patentability of a product-by-process claim is based on the product itself. See In re Brown, 459 F.2d 531, 535, 173 USPQ 685, 688 (CCPA 1972). In other words, the patentability of the product does not depend on its method of preparation. See In re Pilkington, 411 F.2d 1345, 1348, 162 USPQ 145, 147 (CCPA 1969). If the prior art product appears to be substantially the same as the claimed product, the burden is on the applicants to establish with objective evidence that the claimed product is patentably distinct from the product of the prior art. See In re Brown, id.

Concerning that claim requirement for a hydrophobic coating formed using an oligomer/polymer surface modification agent, the examiner turns to the additional teachings of Grainger, including those referred to at page 4 of the answer. In this regard, Grainger discloses, inter alia, the formation of films for imparting hydrophobic substrate surface properties using polymeric materials that react with surface hydroxyl groups. Grainger informs one of ordinary skill in the art that the films can be formed on structures that are microporous, including such microporous structures used in microelectronics. Grainger teaches or suggests that the film chemisorbs (reacts) with surfaces containing oxygen or hydroxyl groups, including dielectric coated semiconductor wafers. See, e.g., column 3, lines 12-28, column 4, line 19 through column 5, line 51, column 12, line 51 through column 13, line 30, and column 14, lines 34-67 of Grainger.

Given the above-noted teachings of Grainger with respect to the use of polymer surface modification to form a hydrophobic surface coating for a porous microelectronic device, we agree with the examiner that it would have been obvious to one of ordinary skill in the art to employ such a surface coating for the nanoporous silica dielectric of Jin. After all, Jin is

concerned with preventing moisture absorption and corrosion of the silanol (Si-OH) groups on the porous dielectric surface of their microelectronic integrated circuit. Thus, Grainger's teachings that the polymers disclosed therein will bond or chemisorb with such hydroxyl groups and that such polymers can be useful in microporous surface applications, including microelectronic circuits, would reasonably have led one of ordinary skill in the art to employ the hydrophobic polymer coating of Grainger in conjunction with the dielectric of Jin, as a surface coating therefore.

In light of the above, appellants' contentions that Grainger does not relate to increasing the hydrophobicity of a porous film, such as the dielectric of Jin, is not persuasive.<sup>4</sup> In this regard, Grainger (column 13, lines 26-30) teaches that the polymeric coatings thereof can be employed with microporous substrates, including microelectronic circuit surfaces. See column 14, lines 34-67 of Grainger. Moreover, appellants' comment (brief, page 7) concerning the alleged long polymeric

---

<sup>4</sup> In this regard, we further note that representative claim 20 is not limited to a particular pore size by the claim term nanoporous as evidenced by the about 1 nm to about 100 nm pore sizes set forth in appellants' Detailed Description of the Preferred Embodiment section of the specification. See page 22 of appellants' specification.

molecules of Grainger being incompatible with a nanoporous film application represents mere attorney argument or conjecture and is not substantiated with any persuasive evidence. Unsupported arguments of counsel simply cannot take the place of evidence. See In re Pearson, 494 F.2d 1399, 1405, 181 USPQ 641, 646 (CCPA 1974).

Further concerning this matter, we observe that appellants (specification, page 11, lines 10-13) disclose that polymers with 10,000 or greater repeating units can be employed in forming their nanoporous film coating. That disclosure undercuts appellants' argument suggesting that the polymers of Grainger (column 3, lines 1-6), which can have a molecular weight as small as on the order of 10,000, would be too large for use with a nanoporous film.

Consequently, we determine that one of ordinary skill in the art would have found ample incentive to employ the hydrophobic coating of Grainger for a nanoporous film as taught by Jin to impart hydrophobic properties thereto based on the combined teachings of those references and with a reasonable expectation of success in so doing.<sup>5</sup>

---

<sup>5</sup> Because we find that the combined teachings of Jin and Grainger make out a prima facie case of obviousness that has not

Accordingly, we will sustain the examiner's obviousness rejection of claims 2-16, 18-21 and 31-34 over Jin in view of Grainger and Kotelnikov.

Concerning the examiner's separate obviousness rejection of claims 22-29 over the same combination of references, as applied against claims 2-16, 18-21 and 31-34, we note that appellants do not furnish separate arguments for each of the rejected claims. Thus, we select claim 22 as the representative claim, on which we shall decide this appeal as to this ground of rejection.

Appellants refer to their arguments against the examiner's rejection of claims 2-16, 18-21 and 31-34 and summarize those contentions in contesting the separate rejection of claims 22-29 at pages 8 and 9 of the brief. Because we do not find those arguments persuasive for the reasons set forth above and in the answer, it follows that we will also affirm the examiner's obviousness rejection of claims 22-29 on this record.

Concerning the examiner's separate obviousness rejection of claim 17, the examiner additionally applies Burns thereto. Claim

---

been persuasively refuted by appellants on this record, we need not reach the additional teachings of Kotelnikov. Also, we note that appellants refer (reply brief, pages 1-4) to the Board Decision in appeal No. 2003-1366. However, that Decision was based on a different evidentiary record. Thus, we decline appellants' invitation to apply that Decision to this appeal.

17, which depends on claim 20, via claims 8 and 7, adds to claim 20 the further proviso that the surface modification agent is not only reactive with silanol, but was prepared via a monomer reaction with water in a solvent and wherein additional monomer, which itself is reactive with silanol, is added after the reaction with water. As noted above, however, the claimed subject matter is drawn to a product, not a process. Thus, claim 17 requires an oligomer or polymer that can be formed via hydrolysis (reaction with water) and that includes at least some excess silanol reactive monomer therewith.

As we noted above, Grainger discloses a silanol (SiOH) reactive polymer that imparts hydrophobic properties to a dielectric or other material. The polymer of Grainger (column 2, lines 35-47) can include repeating units of the general formula -Si-O-. Grainger (column 5, line 4) teaches that hydroxyl functional groups can be employed in forming the polymer, such as  $\text{OC(O)CH}_3$ . Thus, Grainger suggests using monomers including hydroxyl or silanol reactive functional groups in forming the polymer. The examiner has found that Burns teaches that organosilicon monomers are useful hydrophobic property modification agents for silica. Based on the combined teachings of the applied references, the examiner has determined that one

of ordinary skill in the art would have been led to employ both monomers and polymers as hydrophobic property imparting modifying agents in Jin. In this regard, one of ordinary skill in the art would have reasonably expected that combining such known modifiers that impart hydrophobic properties would have been expected to reduce the hydrophilic (moisture adsorption) properties of the dielectric of Jin via the additive effects of each. See In re Kerkhoven, 626 F.2d 846, 850, 205 USPQ 1069, 1072 (CCPA 1980).

Appellants contend that Burns represents non-analogous art because Burns does not disclose modifying a dielectric film on a substrate. We disagree.

The test of whether a reference is from an analogous art is first, whether it is within the field of the inventor's endeavor, and second, if it is not, whether it is reasonably pertinent to the particular problem with which the inventor was involved. See In re Wood, 599 F.2d 1032, 1036, 202 USPQ 171, 174 (CCPA 1979). A reference is reasonably pertinent if, even though it may be in a different field of endeavor, it is one which because of the matter with which it deals, logically would have commended itself

to an inventor's attention in considering the inventor's problem. See In re Clay, 966 F.2d 656, 659, 23 USPQ2d 1058, 1060-61 (Fed. Cir. 1992).

Burns is directed to imparting hydrophobic properties to silica gels. Such a reference is not only in the general field of the inventor's endeavor in describing a method for treating silica to render the same more hydrophobic but would have also logically commended itself to an inventor's attention in the field of treating silica films to reduce their hydrophillic tendencies. This is so as evidenced by Grainger wherein patentee teaches that the polymer coatings thereof are useful in imparting properties, such as hydrophobicity or protection against corrosion or chemical attack to a variety of surfaces comprising silica in a variety of diverse applications, such as glass lined reactors, window glass, and microelectronic surfaces, that require such protection. See, e.g., column 13, lines 9-33 and column 14, lines 34-67 of Grainger. For reasons set forth above and in the answer, appellants' argument of non-analogousness is not persuasive.

Also, appellants' generalized contentions that the combined teachings of the applied references would not suggest the proposed combination is not persuasive for reasons set forth in

the answer and above. Consequently, we affirm the examiner's obviousness rejection of claim 17, on this record.

Regarding the examiner's obviousness-type double patenting rejection of claims 2-29 and 31-34 over the claims of Rutherford in view of Grainger and Kotelnikov, we note that appellants do not furnish separate arguments for the so rejected claims. Thus, we select claim 20, as the representative claim on which we shall decide this appeal as to this rejection.

In obviousness-type double patenting rejections, the analysis employed parallels the guidelines for analysis of a Section 103 obviousness determination. See In re Longi, 759 F.2d 887, 892-93, 225 USPQ 645, 648 (Fed. Cir. 1985).

A review of claim 1 of Rutherford reveals that a nanoporous silica dielectric film coated with a polymer is claimed therein. Appellants argue that the claims of Rutherford do not indicate that the polymer used in the coating is reactive with silanol groups on the silica film, as is required for appealed representative claim 20.<sup>6</sup> However, the examiner relies on

---

<sup>6</sup> Appellants refer to U.S. patent application No. 09/379,484 (now U.S. Patent No. 6,318,124) at page 7, lines 12 and 13 of their specification as being co-owned with the instant application that is the subject of this appeal. Appellants do not contest the rejection advanced by the examiner on the lack of a common assignment/owner and/or a lack of a common inventor

Grainger to show that the use of hydroxyl group (silanol) reactive polymers for forming coatings on films, such as porous silica films, is well known for imparting hydrophobic properties. See, e.g., column 12, line 51 through column 13, line 14 of Grainger. Accordingly, we do not find appellants' argument persuasive. This is because the obviousness-type double patenting rejection is based on the combination of the claimed subject matter of Rutherford with Grainger<sup>7</sup>, not on the claims of Rutherford standing alone.

Appellants argue that Grainger does not teach the formation of a porous film which is hydrophobized. We disagree. Grainger discloses that the polymeric coating disclosed therein can be applied to microporous structures such as silica gel and that the coating can impart hydrophobic properties. See, e.g., column 13, lines 20-33 and column 4, lines 50-56 of Grainger. Thus, one of ordinary skill in the art would have been led to employ polymer films that are reactive with silanol in combination with the

---

between this application and Rutherford (U.S. Patent No. 6,318,124).

<sup>7</sup> The examiner also relies on Kotelnikov. However, we need not discuss the latter reference as we find that the claims of Rutherford in combination with Grainger are sufficient to make out a prima facie case of obviousness-type double patenting.

nanoporous film claimed in Rutherford to impart hydrophobic properties to the claimed nanoporous film of Rutherford. Moreover, we do not find appellants' unsupported contentions concerning the polymeric chain length of the polymers of Grainger as mitigating against their use with a nanoporous film as claimed in Rutherford to be persuasive for reasons analogous to those set forth above with respect to the examiner's Section 103(a) rejections. Accordingly, we affirm the examiner's obviousness-type double patenting rejection, on this record.

#### CONCLUSION

The decision of the examiner to reject claims 2-16, 18-21 and 31-34 under 35 U.S.C. § 103(a) as being unpatentable over Jin in view of Grainger and Kotelnikov; to reject claims 22-29 under 35 U.S.C. § 103(a) as being unpatentable over Jin in view of Grainger and Kotelnikov; to reject claim 17 under 35 U.S.C. § 103(a) as being unpatentable over Jin in view of Grainger, Kotelnikov and Burns; and to reject claims 2-29 and 31-34 under the judicially created doctrine of obviousness-type double patenting over claims 1-19 of U.S. patent No. 6,318,124 in view of Grainger and Kotelnikov is affirmed.

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

AFFIRMED

CHUNG K. PAK	)	
Administrative Patent Judge	)	
	)	
	)	
	)	
	)	BOARD OF PATENT
PETER F. KRATZ	)	APPEALS
Administrative Patent Judge	)	AND
	)	INTERFERENCES
	)	
	)	
JAMES T. MOORE	)	
Administrative Patent Judge	)	

Appeal No. 2005-2522  
Application No. 09/841,453

Page 17

Richard S Roberts  
P.O. Box 484  
Princeton, NJ 08542-0484

