

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(2) is not binding precedent of the Board.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. 27

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte KWO-HSIUNG YOUNG
and JONATHAN Z. SUN

Appeal No. 95-0537
Application 08/077,709¹

ON BRIEF

Before SOFOCLEOUS, HANLON, and PAK, Administrative Patent
Judges.

HANLON, Administrative Patent Judge.

DECISION ON APPEAL

This is an appeal under 35 U.S.C. § 134 from the final

¹Application for patent filed June 15, 1993. According to applicants, the application is a continuation of Application 07/714,139, filed June 11, 1991, abandoned.

Appeal No. 95-0537
Application No. 08/077,709

rejection of claims 1-9, all of the claims pending in the application. Claims 1 and 6 are illustrative of the subject matter on appeal and read as follows:

Claim 1. A superconductive device comprising:

a high temperature superconductive film of at least one micron square having at least 80% by volume a-axis oriented and c-axis aligned in one preferential direction on

a substrate having an anisotropic surface cell.

Claim 6. A superconductive device comprising:

a high temperature superconductive film of at least one micron square including a-axis oriented domains, where the a-axis domains have a c-axis alignment in one preferential direction on

a NdGaO₃ substrate.

The references relied upon by the examiner are:

Gallagher et al. (Gallagher)	4,962,086	Oct. 9, 1990
Beasley et al. (Beasley)	5,047,385	Sep. 10, 1991
		(filed Jul. 20, 1988)

C. B. Eom et al. (Eom), "Epitaxial and Smooth Films of a-Axis Yba₂Cu₃O₇," 249 Science 1549 (Sep. 28, 1990).

The following rejections are at issue in this appeal:

(1) Claims 1-9 are rejected under 35 U.S.C. § 112, first paragraph, as containing new matter.

(2) Claims 1-9 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to

Appeal No. 95-0537
Application No. 08/077,709

particularly point out and distinctly claim the subject matter which applicants regard as the invention.

(3) Claims 1-6 and 8-9 are rejected under 35 U.S.C. § 112, first paragraph, as being based on a non-enabling disclosure.

(4) Claims 1-3 and 5 are rejected under 35 U.S.C. § 101 as reading on inoperative species.

(5) Claims 1, 2 and 5 are rejected under 35 U.S.C. § 102(a)/103 as being unpatentable over Eom.

(6) Claims 1-9 are rejected under 35 U.S.C. § 103 as being unpatentable over the combination of Eom and Gallagher.

(7) Claims 1, 2 and 5 are rejected under 35 U.S.C. § 102(e) as being anticipated by Beasley.

(8) Claims 1-9 are rejected under 35 U.S.C. § 103 as being unpatentable over the combination of Beasley and Gallagher.

New matter rejection under 35 U.S.C. § 112, first paragraph

Claims 1-9 are rejected under 35 U.S.C. § 112, first paragraph, as containing new matter.² According to the

²According to appellants, claims 1-9 which stand rejected under 35 U.S.C. § 112, first paragraph, as containing new

Appeal No. 95-0537
Application No. 08/077,709

examiner (Answer, pp. 4-5):

In Amendment C, the phrase:

"(i.e. it has in-plane alignment or preferential orientation)" is considered new matter,

matter stand or fall together (Brief, p. 13).

Appeal No. 95-0537
Application No. 08/077,709

In Amendment D, most of the amendments to the abstract, specification and claims are new matter. Particularly, the phrase:

"at least one micron square"

is new matter. Other changes with regard to the size and alignment of the superconducting film are also new matter. . . .

Since the specification as originally filed contains no literal recitation of the passages above, they are new matter.

Appellant is required to cancel the new matter in the response to this Office action.

At the outset we note that where alleged new matter is confined to amendments to the specification, review of an examiner's requirement for cancellation is by way of petition. MPEP § 608.04(c) (7th ed., Jul. 1998); see also In re Hengehold, 440 F.2d 1395, 1403, 169 USPQ 473, 479 (CCPA 1971) (an objection to the specification is not an appealable matter under 35 U.S.C. § 134). Therefore, we decline to decide whether the phrase "(i.e. it has in-plane alignment or preferential orientation)" contains new matter since any alleged new matter is confined to the specification.

However, where any alleged new matter is introduced into or affects the claims, thus necessitating their rejection on

Appeal No. 95-0537
Application No. 08/077,709

this ground, the question becomes an appealable one. MPEP § 608.04(c) (7th ed., Jul. 1998). For the reasons set forth by appellants (see Brief, pp.16-17), we agree that appellants' original disclosure provides descriptive support for the following amendments to claims 1 and 6:³

(1) claim 1, line 4: before "aligned" delete "in-plane" and insert --c-axis--,

(2) claim 1, line 4: after "aligned" delete ", and" and insert --in one preferential direction on--,

(3) claim 6, line 4: before "preferential" add --c-axis alignment in one-- , and

(4) claim 6, line 4: after "preferential" delete "in plane orientation, and" and insert --direction on-- ,

However, we disagree with appellants that the application, as originally filed, provides descriptive support for the phrase "of at least one micron square" in claims 1 and 6. The purpose of the written description requirement of 35 U.S.C. § 112, first paragraph, is to convey with reasonable

³In the Answer, the examiner indicates that the addition of "high temperature" to the claims is not considered new matter (Answer, p. 14).

Appeal No. 95-0537
Application No. 08/077,709

clarity to those skilled in the art that, as of the filing date sought, the applicant was in possession of the invention now claimed. Vas-Cath Inc. v. Mahurkar, 935 F.2d 1555, 1564, 19 USPQ2d 1111, 1117 (Fed. Cir. 1991). Compliance with the written description requirement is a question of fact. In re Alton, 76 F.3d 1168, 1175, 37 USPQ2d 1578, 1583 (Fed. Cir. 1996).

We note that there is no literal support in the specification as originally filed for the phrase "of at least one micron square." Nevertheless, appellants rely on a declaration of Michael M. Eddy dated February 22, 1994, to establish that the claims as amended do not contain new matter (Brief, p. 16):

A 'film' would have been understood by those skilled in the art at the time of filing the present application to mean a material having an area larger than several grain sizes. While grain sizes vary . . . a region of one micron square would certainly be a 'film' as opposed to a grain.

However, Eddy fails to provide any factual basis to explain why one having ordinary skill in the art would have understood the term "film" to mean a material having an area larger than several grain sizes. Compare Alton, 76 F.3d at 1179, 37

Appeal No. 95-0537
Application No. 08/077,709

USPQ2d at 1583 (the declaration offers factual evidence in an attempt to explain why one of ordinary skill in the art would have understood the specification to describe the language at issue). Therefore, we agree with the examiner that appellants have failed to establish that the specification, as originally filed, would have conveyed with reasonable clarity to one having ordinary skill in the art that appellants were in possession of the invention now claimed, namely, a film "of at least one micron square." The new matter rejection under 35 U.S.C. § 112, first paragraph, is affirmed.

Rejection under 35 U.S.C. § 112, second paragraph

Claims 1-9 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicants regard as the invention. Specifically, the examiner regards the phrase "preferential direction" as being ambiguous and "high temperature superconductive film" as being indefinite.

According to the examiner, it is unclear what "direction" is "preferential" (Answer, p.6). We disagree. One having ordinary skill in the art would have understood that

Appeal No. 95-0537
Application No. 08/077,709

"preferential direction" as recited in the claims refers to the direction in which the claimed c-axes of the film are aligned (see Brief, p. 19). Compare In re Mattison, 509 F.2d 563, 565, 184 USPQ 484, 486 (CCPA 1975) (use of "substantially increase" in a claim does not render that claim indefinite under 35 U.S.C. § 112, second paragraph, since the phrase does not stand in a vacuum but must be read in light of the specification and when so read, one skilled in the art can determine the scope of the claimed invention). Similarly, one having ordinary skill in the art would have understood "high temperature superconductive film" to mean a film made of superconducting material which undergoes a phase transition from a state of normal electrical resistivity to a superconducting state at a temperature higher than 30K (see Specification, p. 1, lines 9-13; Brief, pp. 17-18). See In re Prater, 415 F.2d 1393, 1404-05, 162 USPQ 541, 550-51 (CCPA 1969) (claim cannot be read in a vacuum, but rather must be read in light of specification to thereby interpret limitations explicitly recited in claim). Therefore, the rejection of claims 1-9 under 35 U.S.C. § 112, second paragraph, is reversed.

Appeal No. 95-0537
Application No. 08/077,709

Rejection under 35 U.S.C. § 112, first paragraph

Claims 1-6 and 8-9 are rejected under 35 U.S.C. § 112, first paragraph, as being based on a non-enabling disclosure.⁴ According to the examiner, the unpredictable nature of the superconductor art, as it existed at the time appellants filed their application, requires that the claims be limited to the specific superconductors disclosed in the specification. See In re Fisher, 427 F.2d 833, 837-38, 166 USPQ 18, 22 (CCPA 1970) ("the scope of the claims must bear a reasonable correlation to the scope of enablement provided by the specification to persons of ordinary skill in the art. . . . In cases involving unpredictable factors, such as most chemical reactions and physiological activity, the scope of enablement obviously varies inversely with the degree of unpredictability of the factors involved.").

However, relying on In re Angstadt, 537 F.2d 498, 502, 190 USPQ 214, 218 (CCPA 1976), appellants argue that it is improper to limit the present claims to only those particular

⁴According to appellants, claims 1-6 and 8-9 which stand rejected under 35 U.S.C. § 112, first paragraph, as being based on a non-enabling disclosure do not stand or fall together (Brief, p. 13).

Appeal No. 95-0537
Application No. 08/077,709

substrates and superconductive films disclosed in the specification (Brief, pp. 20-21). Appellants argue that the specification enables a person skilled in the art to make the superconductive device claimed using any superconducting film which is "a-axis oriented" and has its c-axes "aligned in one preferential direction" and any substrate which has an "anisotropic surface cell" (Brief, p. 22). We disagree.

Although applicants are not required to disclose every species encompassed by their claims, even in an unpredictable art, each case must be determined on its own facts. In this case, appellants have disclosed one embodiment of the claimed invention, a YBCO or thallium superconductive film grown on a neodymium gallate substrate. Compare Angstadt, 537 F.2d at

502, 190 USPQ at 218 (armed with the specification and its 40 working examples, one having ordinary skill in the art would have been able to determine which catalyst complexes within the scope of the claims work to produce hydroperoxides and which do not). According to the examiner (Answer, p. 7):

Appellant is not enabled for all substrate/
superconductor composites. It was well known in the
art that the oxide superconductors react
unpredictably and have thermal mismatch problems
with many substrates, thereby destroying

Appeal No. 95-0537
Application No. 08/077,709

superconductivity (pages 267-268 of the "Engineer's Guide to High Tc Superconductivity" and Sahu et al, p. 7, 2nd full paragraph). Relying upon Fisher, id. [Fisher, 427 F.2d at 837-38, 166 USPQ at 22], it is the Examiner's position that the unpredictable reactions between oxide superconductors and their substrates requires that the claims be limited to the specific substrate materials in the specification.

Appellants have failed to establish otherwise. See In re Piasecki, 745 F.2d 1468, 1472, 223 USPQ 785, 788 (Fed. Cir. 1984) ("after a prima facie case of unpatentability has been established, the burden of going forward shifts to the applicant"). Therefore, the rejection of claims 1-6 and 8-9 under 35 U.S.C. § 112, first paragraph, is affirmed.

Appeal No. 95-0537
Application No. 08/077,709

Rejection under 35 U.S.C. § 101

Claims 1-3 and 5 are rejected under 35 U.S.C. § 101 as reading on inoperative species. However, the specification discloses a preferred superconductive device comprising a YBCO superconducting film, having greater than 90% a-axis oriented and over 90% c-axis aligned in one direction, deposited on a neodymium gallate substrate (Specification, p. 5, line 34-p. 7, line 4). Therefore, we reverse the rejection of claims 1-3 and 5 under 35 U.S.C. § 101. See Envirotech Corp. v. Al George, Inc., 730 F.2d 753, 762, 221 USPQ 473, 480 (Fed. Cir. 1984) ("the defense of non-utility cannot be sustained without proof of total incapacity"); see also Brooktree Corp. v. Advanced Micro Devices, Inc., 977 F.2d 1555, 1571, 24 USPQ2d 1401, 1412 (Fed. Cir. 1992) ("[t]o violate §101 the claimed device must be totally incapable of achieving a useful result").

Rejection under 35 U.S.C. § 102(a)/103

Claims 1, 2 and 5 are rejected under 35 U.S.C. § 102(a)/103 as being unpatentable over Eom.

Claim 1 on appeal relates to a superconductive device comprising a high temperature superconductive film "having at

Appeal No. 95-0537
Application No. 08/077,709

least 80% by volume a-axis oriented and c-axis aligned in one preferential direction on a substrate having an anisotropic surface cell." Eom discloses a-axis oriented superconductive films which have been grown epitaxially on SrTiO_3 and LaAlO_3 substrates. According to Eom (p. 1550, second column):

Figure 1 shows a planar view transmission electron micrograph of a typical a-axis film. Lattice fringes perpendicular to the c-axis are clearly seen in the a-axis oriented grains. The a-axis oriented YBCO grains are seen to be 100 to 500 D wide. The predominant a-axis grains lie along one of two orthogonal directions, with their c-axes along the substrate [100] or [010].

Eom continues (p. 1550, third paragraph):

Figure 2B shows the dependence of x-ray intensity corresponding to the YBCO (102) reflection as a function of azimuthal angle. The main peaks correspond to the epitaxial arrangements $\text{YBCO}[001]/\text{SrTiO}_3[100]$ and $\text{YBCO}[001]/\text{SrTiO}_3[010]$. Close to 99.9 volume percent of the a-axis grains lie along these directions. [Emphasis added.]

Referring to Figure 2B of Eom, appellants point out (Brief, pp. 7-8):

[T]he Eom film includes two peaks of substantially the same size, one reflection at \mathbf{N} = about 50E and the other reflection at \mathbf{N} = about 140E and, therefore, represents that substantially half of the CuO planes lie in one direction and the other half in another direction which is about 90E from the first.

Appeal No. 95-0537
Application No. 08/077,709

Appellants conclude, and we agree, that Eom discloses an a-axis film where about 50% of the c-axes are aligned in one direction and about 50% of the c-axes are aligned in another direction (Brief, p. 23). Therefore, Eom fails to anticipate the invention of claim 1. See Verdegaal Bros., Inc. v. Union Oil Co., 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir.), cert. denied, 484 U.S. 827 (1987) ("A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference."). The rejection of claims 1, 2 and 5 under 35 U.S.C. § 102(a)/103 is reversed.⁵

Rejection under 35 U.S.C. § 102(e)

Claims 1, 2 and 5 are rejected under 35 U.S.C. § 102(e) as being anticipated by Beasley. Beasley discloses a method of selectively growing an a-axis or a c-axis oriented film of $\text{YBa}_2\text{Cu}_3\text{O}_{7-x}$. According to the examiner (Answer, p. 12):

Beasley recognizes, as Applicant does, that lowering

⁵According to the examiner (Answer, p. 10), the rejection "is also being made under both 102/103, because Eom does not 'explicitly' disclose 'at least 1 micron squared'." Since, for the reasons set forth above, the teachings of Eom fail to expressly disclose or suggest the other limitations of claim 1, it is not necessary to address this additional limitation.

Appeal No. 95-0537
Application No. 08/077,709

the superconductor formation temperature is the key parameter in forming epitaxial a-axis films. Compare col. 3, line[s] 10-25 of Geballe [sic, Beasley] with page 6 of Appellant's specification.

Appellants argue (Brief, p. 31):

[T]he present invention is not merely growing a-axis films epitaxially. Rather, the present invention is to be able to control the orientation of the c-axes in an a-axis film. . . . No where does Beasley discuss, disclose or even mention controlling the positioning of the c-axes in an a-axis film. [Emphasis in original.]

We agree with appellants that Beasley is silent as to the alignment of c-axes in an a-axis film.

To the extent that both Beasley and appellants use lower temperatures to produce their respective a-axis films, Beasley recognizes that annealing at lower temperatures for an extended period of time after deposition of the film produces a-axis films (col. 3, lines 10-15):

Films as deposited are basically various amorphous-like oxides according to the X-ray diffraction data. Subsequently they have usually been annealed for 3 hours at 650EC. followed by 1 hour at 750EC. and 1 hour at 850EC. Our experience shows that these annealing steps are enough for a-axis oriented films.

In contrast, appellants disclose that maintaining the substrate at a lower temperature during deposition produces an

Appeal No. 95-0537
Application No. 08/077,709

a-axis film having c-axis alignment in one direction

(Specification, p. 6):

The substrate is heated in the laser ablation apparatus prior to deposition of the film. For films grown with a substrate temperature between 810 and 830EC, the majority of the film is c-axis textured, with small amounts of a-axis grains being formed. In the preferred embodiment, the substrate temperature is initially made lower than this temperature, preferably by from 50 to 100EC, to promote a-axis nucleation In the preferred embodiment, the substrate temperature was held at 700EC during deposition. If desired, following nucleation of the a-axis film, the substrate temperature may be raised to ordinary processing temperatures to enhance the film crystallinity and superconducting properties of the film.

Despite the above-identified differences, the examiner has failed to explain how one having ordinary skill in the art would have arrived at the claimed invention based on the teachings in Beasley. See In re Oetiker, 977 F.2d 1443, 1444, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992) (the examiner bears the initial burden of presenting a prima facie case of unpatentability). Therefore, the rejection of claims 1, 2 and 5 under 35 U.S.C. § 102(e) as being anticipated by Beasley is reversed.

Rejections under 35 U.S.C. § 103

Appeal No. 95-0537
Application No. 08/077,709

Claims 1-9 are rejected under 35 U.S.C. § 103 as being unpatentable over (1) the combination of Eom and Gallagher and (2) the combination of Beasley and Gallagher.

Claims 1-9 are directed to a superconductive device comprising an a-axis film wherein the c-axes are aligned in one

Appeal No. 95-0537
Application No. 08/077,709

preferential direction on a substrate. For the reasons set forth above, Eom and Beasley fail to suggest the invention of claims 1-9.

Gallagher discloses superconductive films which can be epitaxially deposited on gallate substrates (col. 3, lines 54-61). However, Gallagher adds nothing to the deficiencies of Eom or Beasley. In contrast to appellants' invention, Gallagher discloses a c-axis film. See col. 9, lines 50-52 ("to grow epitaxial films with desirable superconducting properties the c-axis is preferably normal to the substrate interface"); col. 10, lines 6-11 (YBa₂Cu₃O_x films were epitaxially deposited on chemically polished LaGaO₃ crystal wafers; these films are epitaxial with their c-axis normal to the growth interface). Therefore, the rejections of claims 1-9 under 35 U.S.C. § 103 as being unpatentable over (1) the combination of Eom and Gallagher and (2) the combination of Beasley and Gallagher are reversed.

Appeal No. 95-0537
Application No. 08/077,709

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

AFFIRMED

MICHAEL SOFOCLEOUS)	
Administrative Patent Judge)	
)	
)	
)	BOARD OF PATENT
ADRIENE LEPIANE HANLON)	APPEALS AND
Administrative Patent Judge)	INTERFERENCES
)	
)	
CHUNG K. PAK)	
Administrative Patent Judge)	

ALH:svt

Appeal No. 95-0537
Application No. 08/077,709

David B. Murphy
LYON & LYON
611 West Sixth Street
34th Floor
Los Angeles, CA 90017