

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(2) is not binding precedent of the Board.

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte STEPHEN J. FONASH
and
RAMESH KAKKAD

Appeal No. 1997-1319
Application 08/290,227¹

ON BRIEF

Before URYNOWICZ, JERRY SMITH, and GROSS, Administrative
Patent Judges.

JERRY SMITH, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on the appeal under 35 U.S.C. § 134
from the examiner's rejection of claims 2-9, 11-15, 21-24, 26

¹ Application for patent filed August 15, 1994. According to
appellants, this application is a continuation of application 07/808,309,
filed December 16, 1991.

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and 27, which constitute all the claims remaining in the application.

The disclosed invention pertains to a method for producing a large grain highly conductive thin film material. The process begins by depositing upon a substrate a film of amorphous material such as amorphous silicon. The amorphous film is then annealed which creates nuclei and induces the growth of large grain crystals. The resulting material is said to have conductivity characteristics substantially greater than the original amorphous material.

Representative claim 26 is reproduced as follows:

26. A process for producing a large grain highly conductive thin film material without use of ion implantation, the process comprising the following steps:

(a) depositing upon a substrate a film of amorphous precursor material that is substantially free of crystal growth-inducing nuclei and sites, said film having a thickness T and a first electrical conductivity S1;

(b) following step (a), annealing said film to create nuclei and induce growth of large grain crystals having lateral dimensions substantially larger than said thickness T, and to produce a second electrical conductivity S2 that is at least about 10^4 greater than S1.

The examiner relies on the following references:

Guckel et al. (Guckel)	4,897,360	Jan. 30, 1990
Chiang et al. (Chiang)	4,904,611	Feb. 27, 1990

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Cederbaum et al. (Cederbaum I)	5,100,817	Mar. 31, 1992 (filed July 12, 1991)
Cederbaum et al. (Cederbaum II)	5,112,765	May 12, 1992 (filed July 16, 1991)

Claims 26, 2-5, 8, 9, 27, 15, 21, 23, and 24 stand rejected under 35 U.S.C. § 103 as being unpatentable over the collective teachings of Guckel and Chiang. All the claims additionally stand rejected under 35 U.S.C. § 103 as being unpatentable over the collective teachings of Guckel, Chiang, Cederbaum I and Cederbaum II.

Rather than repeat the arguments of appellants or the examiner, we make reference to the brief and the answer for the respective details thereof.

OPINION

We have carefully considered the subject matter on appeal, the rejections advanced by the examiner and the evidence of obviousness relied upon by the examiner as support for the rejections. We have, likewise, reviewed and taken into consideration, in reaching our decision, the appellants' arguments set forth in the brief along with the examiner's

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rationale in support of the rejections and arguments in rebuttal set forth in the examiner's answer.

It is our view, after consideration of the record before us, that the evidence relied upon and the level of skill in the particular art does not support the rejection of the claims as formulated by the examiner. Accordingly, we reverse.

Appellants have indicated that for purposes of this appeal the claims will all stand or fall together as a single group [brief, page 4]. Consistent with this indication appellants have made no substantial separate arguments with respect to any of the claims on appeal. Accordingly, all the claims before us will stand or fall together. Note In re King, 801 F.2d 1324, 1325, 231 USPQ 136, 137 (Fed. Cir. 1986); In re Sernaker, 702 F.2d 989, 991, 217 USPQ 1, 3 (Fed. Cir. 1983). Therefore, we will consider the rejection against independent claim 26 as representative of all the claims on appeal.

In rejecting claims under 35 U.S.C. § 103, it is incumbent upon the examiner to establish a factual basis to support the legal conclusion of obviousness. See In re Fine,

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837 F.2d 1071, 1073, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). In so doing, the examiner is expected to make the factual determinations set forth in Graham v. John Deere Co., 383 U.S. 1, 17, 148 USPQ 459, 467 (1966), and to provide a reason why one having ordinary skill in the pertinent art would have been led to modify the prior art or to combine prior art references to arrive at the claimed invention. Such reason must stem from some teaching, suggestion or implication in the prior art as a whole or knowledge generally available to one having ordinary skill in the art. Uniroyal, Inc. v. Rudkin-Wiley Corp., 837 F.2d 1044, 1051, 5 USPQ2d 1434, 1438 (Fed. Cir.), cert. denied, 488 U.S. 825 (1988); Ashland Oil, Inc. v. Delta Resins & Refractories, Inc., 776 F.2d 281, 293, 227 USPQ 657, 664 (Fed. Cir. 1985), cert. denied, 475 U.S. 1017 (1986); ACS Hosp. Sys., Inc. v. Montefiore Hosp., 732 F.2d 1572, 1577, 221 USPQ 929, 933 (Fed. Cir. 1984). These showings by the examiner are an essential part of complying with the burden of presenting a prima facie case of obviousness. Note In re Oetiker, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992).

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With respect to representative, independent claim 26, the examiner cites Guckel as teaching the deposition of a small grain film to be annealed. Chiang is cited as teaching the crystallization of an amorphous silicon film. The examiner asserts that it would have been obvious to the artisan to deposit a film of amorphous silicon as taught by Chiang without nucleation sites as taught by Guckel [rejection mailed April 3, 1995].

Appellants argue that the polysilicon film of Guckel is a fine grain film which is laden with nucleation sites. Inventor Fonash has filed two declarations in support of this contention. Appellants also argue that although Chiang teaches annealing an amorphous silicon film, Chiang uses ion implantation during the annealing process, which is contrary to the invention of the pending claims. Appellants also argue that the conductivity results recited in the pending claims are not achieved by the thin films of either Guckel or Chiang [brief, pages 6-16].

The linchpin of the examiner's position is that notwithstanding appellants' arguments or the Fonash declarations, Guckel clearly teaches "avoiding nucleation

sites in the starting film" and appellants are ignoring the clear teachings of the reference [answer, page 2]. In our view, it is the examiner who has misconstrued the teachings of Guckel.

Guckel teaches that the substrate is cleaned prior to deposition of a polysilicon film to avoid nucleation sites on the substrate which could be caused by any type of contamination on the substrate. Thus, Guckel is not avoiding nucleation sites within the thin film material, but only artificially induced nucleation sites on the substrate caused by contaminants. Independent claims 26 and 27 both recite that the amorphous film itself is substantially free of nuclei at the time it is deposited. The polysilicon of Guckel is a crystallized material which will have natural nucleation sites at the borders of the crystals. Thus, the examiner's fundamental position that Guckel teaches depositing a film free of nucleation sites is simply not supported by the disclosure of Guckel. In fact, the Guckel polysilicon has many nucleation sites which results in a film having many small grain crystals rather than the large grain crystals as recited in claims 26 and 27.

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Since the examiner's analysis completely mischaracterizes the teachings of Guckel, the rationale proposed by the examiner for combining the teachings of Chiang with Guckel is without basis. In fact, we agree with appellants that the fine grain crystals of Guckel are inconsistent with Chiang's desire to create large grain crystals. Therefore, there would be no motivation to combine the teachings of Chiang with those of Guckel. It should be noted that neither of the Cederbaum references overcomes the error in the examiner's combination of Guckel and Chiang.

Accordingly, we do not sustain the examiner's rejection of claims 2-9, 11-15, 21-24, 26 and 27 based upon the teachings of Guckel and Chiang or the collective teachings of Guckel, Chiang and the Cederbaum references.

In view of the examiner's mischaracterization of the teachings of Guckel, we feel compelled to make some observations about the patentability of the appealed claims based on the teachings of Chiang taken alone. Chiang clearly teaches the steps of depositing an amorphous silicon film onto a substrate and annealing the film to create large grain crystals. Appellants have argued that Chiang uses an ion

implantation step whereas the claimed invention recites a process without using ion implantation.

Our first observation is that Chiang uses ion implantation as an improvement, and Chiang recognizes that the process could be performed without ion implantation. Note that Chiang compares the results of ion-implanted amorphous silicon films to as-deposited (non-implanted) amorphous silicon films [column 4, lines 40-51]. Thus, Chiang seems to suggest the process without ion implantation as claimed, but Chiang finds the implanted embodiment to be superior.

Our second observation is that the claimed recitation "without use of ion implantation" appears to be contrary to the invention as set forth in appellants' disclosure. Figure 3 of appellants' application depicts the formation of a thin film material according to the invention. Figure 3 shows a deposition reactor 44 in which an amorphous film is deposited from a source material 46 which is doped by dopants 48 during the deposition process. We fail to see how a process which includes such a doping step can be said to be "without use of ion implantation."

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Thus, it would appear that Chiang may actually teach the invention as claimed except for the recitation regarding the electrical conductivity of the annealed amorphous film. Chiang gives no specific values of the conductivities of the thin film of his invention or of the as-deposited (non-implanted) thin film, and the examiner has made no observations on this point. One could draw the inference from appellants' disclosure that the claimed conductivity relationship resulted naturally from annealing an amorphous silicon film, or that the claimed conductivity relationship resulted from a specific selection of film thickness, annealing temperature, dopant levels and so forth.

The point is that Chiang alone seems to be very a good reference with respect to the disclosed and claimed invention, but a consideration of the obviousness of the claimed invention over Chiang taken alone requires a consideration of facts which have not been investigated on this record. We leave it to the examiner to decide whether a factual record can be created which would support a rejection of the appealed claims based on Chiang taken alone or Chiang taken with any other pertinent prior art. We simply point out that a further

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development of the facts would seem to be warranted in this case.

In summary, we have not sustained the examiner's rejection of the claims because of his misunderstanding of the teachings of Guckel. Therefore, the decision of the examiner rejecting claims 2-9, 11-15, 21-24, 26 and 27 is reversed.

REVERSED

	STANLEY M. URYNOWICZ, JR.)	
	Administrative Patent Judge)	
)	
)	
	JERRY SMITH)	BOARD OF
PATENT	Administrative Patent Judge)	APPEALS AND
)	INTERFERENCES
)	
	ANITA PELLMAN GROSS)	
	Administrative Patent Judge)	

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Flehr, Hohbach, Test, Albritton & Herbert
3400 Four Embarcadero Center
San Francisco, CA 94111-4187