

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

Paper No. 26

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte MUNEHIRO SHIBUYA, MASATOSHI KITAGAWA,
YUUJI MUKAI and AKIHISA YOSHIDA

Appeal No. 1999-2464
Application No. 08/701,292

ON BRIEF

Before GARRIS, KRATZ and JEFFREY T. SMITH, *Administrative Patent Judges*.
JEFFREY T. SMITH, *Administrative Patent Judge*.

DECISION ON APPEAL

Applicants appeal the decision of the Primary Examiner finally rejecting claims 1 to 4 and 12 to 17.¹ We have jurisdiction under 35 U.S.C. § 134.

¹ Claims 5 to 11 have been canceled. (Brief, p. 2.)

BACKGROUND

Appellants' invention relates to a silicon structure which can be applied to a light emitting device or solar battery. According to Appellants, the silicon materials of the claimed invention provides excellent light absorption. Claims 1 and 12, which are representative of the claimed invention, appear below:

1. Silicon having a structure comprising an aggregate of a plurality of columnar silicon members mainly comprising silicon and having random orientations,

the columnar silicon members being at least partially spaced from each other whereby light reflected from one of the columnar silicon members can enter another of the columnar silicon members.

12. A solar battery comprising a semiconductor layer for generating electron-hole pairs by light absorption, wherein the semiconductor layer comprises silicon having a structure comprising an aggregate of a plurality of columnar silicon members mainly comprising silicon and having random orientations,

the columnar silicon members being at least partially spaced from each other whereby light reflected from one of the columnar silicon members can enter another of the columnar silicon members.

CITED PRIOR ART

As evidence of unpatentability, the Examiner relies on the following reference:

Maruyama et al. (Maruyama)	4,433,202	Feb. 21, 1984
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Claims 1 to 4 and 12 to 17 are rejected as unpatentable under 35 U.S.C. § 102(b) as anticipated by or, in the alternative under 35 U.S.C. § 103(a) as obvious over Maruyama. (Answer, p. 3).

DISCUSSION

We have carefully reviewed the claims, specification and applied prior art, including all of the arguments advanced by both the Examiner and Appellants in support of their respective positions. This review leads us to conclude that the Examiner's §§ 102 and 103 rejections are not well founded.

A fatal deficiency common to all of the rejections is the Examiner's position that the crystalline grains of silicon column-like and/or cone-like structure, of Maruyama, are partially separated from one another due to the presence of an amorphous phase such that light is reflected from one of the columnar silicon members to another columnar silicon member. (Answer, p. 5).

Maruyama does not discuss the reflection of light from one crystalline grain of silicon to another crystalline grain of silicon. The Examiner states "the amorphous periphery could be viewed as spacing the columnar members and thereby allowing light reflected from one grain to another." (Answer, p. 5). To the contrary, according to Maruyama, the amorphous layer at the surface of the solar cell, which covers the top of the crystalline grains, creates a

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window effect. (Col. 5, ll. 16 to 31). Thus, the window effect is not the result of light reflecting from one crystalline grain to another crystalline grain as asserted by the Examiner. Moreover, Maruyama discloses the silicon film should be formed such that the fibrous grains are continuous in the main part of the film and the growth of the fibrous grain is substantially vertical to the barrier plane of the solar cell such that the electrons and positive holes, upon entering the grains from the amorphous region, to move through the grains to the barrier layer without returning to the amorphous region. (Col. 5, ll. 40 to 60).

In a preferred embodiment, the columnar structure of the claimed invention is defined by the polycrystalline center and amorphous periphery. Specifically, the specification states: “the periphery of the columnar silicon member is amorphous and the center thereof is polycrystalline.” (Substitute specification, page 3). Figure 6 exhibits the columnar structure (48) is composed of an amorphous periphery (44) and a polycrystalline center (43). Figure 6 also exhibits the columns are separated by the transparent electrode (45). (Substitute specification, pages 13 and 14, and figure 6). Thus, the amorphous periphery forms part of the columnar silicon member and is not a separating medium.

The Examiner has failed to establish that Maruyama anticipates the claimed invention, either explicitly or inherently. *See In re Schreiber*, 128 F.3d 1473, 1477, 44 USPQ2d 1429, 1433 (Fed. Cir. 1997).

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The Examiner has also rejected the claims under 35 U.S.C. § 103(a) as obvious over Maruyama. The Examiner states “[t]his rejection is set forth in prior Office action, Paper No. 11.” (Answer, p. 3). However, paper no. 11 does not provide an analysis of the claims under 35 U.S.C. § 103. The initial burden of presenting evidence to support a *prima facie* case of obviousness rests with the Examiner. *See In re Oetiker*, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992). In appropriate circumstances, a single prior art reference can render a claim obvious. *See, e.g., B.F. Goodrich Co. v. Aircraft Braking Sys. Corp.*, 72 F.3d 1577, 1582, 37 USPQ2d 1314, 1318 (Fed. Cir. 1996); *In re O’Farrell*, 853 F.2d 894, 902, 7 USPQ2d 1673, 1680 (Fed. Cir. 1988). However, there must be a showing of a suggestion or motivation to modify the teachings of that reference to the claimed invention in order to support a conclusion of obviousness. The Examiner has failed to provide the requisite analysis to support a rejection of the claims under § 103.

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CONCLUSION

For the above stated reasons, we cannot sustain the § 102(b) and § 103(a) rejections before us on this appeal.

REVERSED

BRADLEY R. GARRIS
Administrative Patent Judge

PETER F. KRATZ
Administrative Patent Judge

JEFFREY T. SMITH
Administrative Patent Judge

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MERCHANT & GOULD, P.C.
P.O. BOX 2903
MINNEAPOLIS, MN 55402-0903