Trials@uspto.gov
571-272-7822

Paper No. 26
Entered: November 16, 2017

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

HAMAMATSU CORPORATION,
Petitioner,

v.

PRESIDENT & FELLOWS OF HARVARD COLLEGE
Patent Owner.

Case IPR2016-01143
Patent 7,884,446 B2

Before JONI Y. CHANG, JENNIFER S. BISK, and JACQUELINE T. HARLOW, *Administrative Patent Judges.*

HARLOW, *Administrative Patent Judge.*

FINAL WRITTEN DECISION
Determining Claims 1–6 and 11 Have Been Shown To Be Unpatentable
35 U.S.C. § 318(a) and 37 C.F.R. § 42.73

I. INTRODUCTION

Hamamatsu Corporation ("Petitioner"), filed a Petition requesting an *inter partes* review of claims 1–11 of U.S. Patent No. 7,884,446 B2 (Ex. 1001, "the '446 patent"). Paper 1 ("Pet."). President & Fellows of Harvard College, ("Patent Owner"), filed a Preliminary Response to the Petition. Paper 6 ("Prelim. Resp."). We determined that the information presented in the Petition demonstrated that there was a reasonable likelihood that Petitioner would prevail in challenging claims 1, 2, 4–6 and 11 as unpatentable under 35 U.S.C. § 102(b), and in challenging claim 3 as unpatentable under 35 U.S.C. § 103(a). Pursuant to 35 U.S.C. § 314, the Board instituted trial on November 22, 2016, as to those claims of the '446 patent. Paper 7 ("Institution Decision" or "Inst. Dec.").

Following our institution, Patent Owner filed a Response to the Petition (Paper 10, "PO Resp.") and Petitioner filed a Reply to the Patent Owner Response (Paper 13, "Reply"). An oral hearing was held on July 17, 2017. The transcript of the hearing has been entered into the record. Paper 25 ("Tr.").

We have jurisdiction under 35 U.S.C. § 6. This Final Written Decision is issued pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. Based on the record before us, we conclude that Petitioner has demonstrated by a preponderance of the evidence that claims 1–6 and 11 of the '446 patent are unpatentable.

A. Related Matter

The '446 patent is asserted against Petitioner in *SiOnyx LLC, et al. v. Hamamatsu Photonics K.K., et al.*, Case No. 1:15-cv-13488-FDS (D. Mass.). Pet. 1.

B. The '446 Patent

The '446 patent is titled "Femtosecond Laser-Induced Formation of Submicrometer Spikes on a Semiconductor Substrate." Ex. 1001, [54]. The '446 patent is a division of U.S. Patent Application No. 11/196,929, filed on August 4, 2005, now U.S. Patent No. 7,442,629, which is a continuation-in-part of U.S. Patent Application Nos. 10/950,248 and 10/950,230, now U.S. Patent Nos. 7,354,792 and 7,057,256, respectively, each of which was filed on September 24, 2004. *Id*. [60].

The '446 patent describes "methods for generating submicron-sized features on a semiconductor surface by irradiating the surface with short laser pulses" and devices produced by such methods. *Id*. 1:50–52. In discussing the advantages of the claimed invention, the '446 patent explains that although techniques for generating micrometer-sized structures on silicon surfaces are well-known, the claimed invention satisfies the need "for enhanced methods that allow generating even smaller structures on semiconductor surfaces, and particularly on silicon surfaces." *Id*. at 1:38–46, 1:50–52.

The ’446 patent describes the generated features as substantially columnar spikes, that extend from a base to a tip, and “protrude above the surface.” *Id*. at 1:58–60.

> In many embodiments, the average height of the spikes (i.e., the average separation between the base and the tip) can be less than about 1 micron, and the spikes can have an average width—defined, for example, as the average of the largest dimensions of cross-sections of the spikes at half way between the base and the tip—that ranges from about 100 nm to about 500 nm (e.g., in a range of about 100 nm to about 300 nm).

Id. at 1:60–67.

Figures 5A and 5B of the ’446 patent are reproduced below.

FIG. 5A

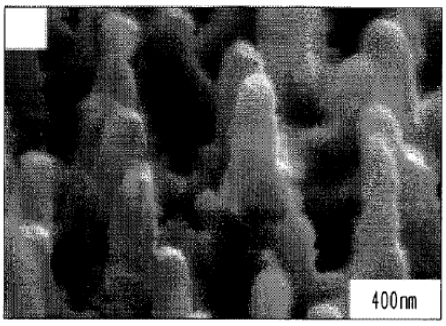
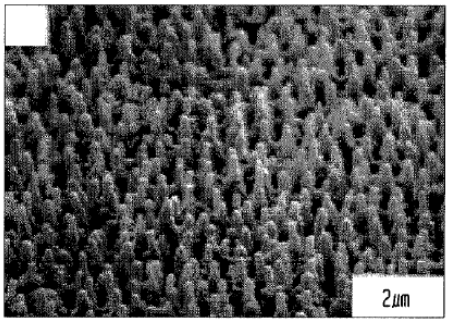


FIG. 5B



Figures 5A and 5B “are scanning electron micrographs of silicon spikes formed on a silicon surface viewed at 45° angle relative to a normal to the surface, formed by placing the surface in contact with distilled water and irradiating it with 100-fs, 400-nm, 60-μJ laser pulses[.]” *Id.* at 3:38–43. The ’446 patent explains that the spikes depicted in Figures 5A and 5B “have a substantially columnar shape with a typical height of about 500 nm and a typical diameter of about 200 nm. They protrude up to about 100 nm above the original surface of the wafer.” *Id*. at 6:8–14.

C. Illustrative Claim

Claim 1, reproduced below, is the sole independent challenged claim, and is illustrative of the claimed subject matter.

> 1. A semiconductor substrate, comprising
>
> a surface layer having at least a portion exhibiting an undulating topography characterized by a plurality of submicron-sized features having an average height less than about 1 micrometer and an average width in a range of about 100 nm to about 500 nm.

Ex. 1001, 8:31–36.

D. Instituted Grounds of Unpatentability

We instituted *inter partes* review in this proceeding based on the following patentability challenges:

Claim(s)	Basis	Reference(s)
1, 2, 4–6, and 11	§ 102(b)	Uematsu[1]
3	§ 103(a)	Uematsu

Petitioner relies on the Declaration of Shukri J. Souri, Ph.D. ("Souri Declaration," Ex. 1007) to support its Petition and Reply.

Patent Owner does not rely on expert testimony to support its Patent Owner Response to the Petition. Patent Owner does, however, rely on the Declaration of Dr. Ezekiel Kruglick, Ph.D. ("Kruglick Declaration,"

[1] Uematsu et al., JP H06 244444, published September 2, 1994 (Ex. 1004). Petitioner submitted a certified English translation of Uematsu as Ex. 1005. Our citations to Uematsu are to the English translation.

DOCKET ALARM

Explore Litigation Insights

Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

Real-Time Litigation Alerts

Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

Advanced Docket Research

With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

Analytics At Your Fingertips

Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

LAW FIRMS
Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

FINANCIAL INSTITUTIONS
Litigation and bankruptcy checks for companies and debtors.

E-DISCOVERY AND LEGAL VENDORS
Sync your system to PACER to automate legal marketing.