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Paper 17
Date: January 13, 2021

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ILLUMINA, INC.,
Petitioner,

v.

TRUSTEES OF COLUMBIA UNIVERSITY
IN THE CITY OF NEW YORK,
Patent Owner.

IPR2020-01323
Patent 10,428,380 B2

Before ZHENYU YANG, JAMES A. WORTH, and
ROBERT A. POLLOCK, *Administrative Patent Judges.*

YANG, *Administrative Patent Judge*.

DECISION

Granting Institution of *Inter Partes* Review
35 U.S.C. § 314

I. INTRODUCTION

Illumina, Inc. ("Petitioner") filed a Petition (Paper 2 ("Pet.")), seeking an *inter partes* review of claims 1–4 of U.S. Patent No. 10,428,380 B2 (Ex. 1005, "the '380 patent"). Trustees of Columbia University in the City of New York ("Patent Owner") filed a Preliminary Response (Paper 11 ("Prelim. Resp.")). With our authorization (Paper 12), Petitioner filed a Reply (Paper 13), and Patent Owner filed a Sur-Reply (Paper 15).

We have authority under 35 U.S.C. § 314, which provides that an *inter partes* review may not be instituted "unless . . . there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition." 35 U.S.C. § 314(a). The Federal Circuit has interpreted the statute to require "a simple yes-or-no institution choice respecting a petition, embracing all challenges included in the petition." *PGS Geophysical AS v. Iancu*, 891 F.3d 1354, 1360 (Fed. Cir. 2018).

For the reasons provided below, we determine Petitioner has satisfied the threshold requirement set forth in 35 U.S.C. § 314(a). Thus, based on the information presented, we institute an *inter partes* review of claims 1–4 of the '380 patent on all grounds.

A. Related Matters

According to the parties, the '380 patent is the subject of *Trustees of Columbia Univ. v. Illumina, Inc.*, Case No. 19-cv-1681 (D. Del.). Pet. 73; Paper 4, 1. In that same litigation, Patent Owner also asserted against Petitioner U.S. Patent Nos. 10,407,458, 10,407,459, 10,435,742, and 10,457,984. Pet. 73; Paper 4, 1. Petitioner filed IPR2020-00988, IPR2020-01065, IPR2020-01177, and IPR2020-01125, respectively, seeking *inter*

partes review of claims of those patents. Pet. 73; Paper 4, 1. The Board has instituted an *inter partes* review in each of those IPRs.

Petitioner previously filed two sets of petitions, challenging claims of several of Patent Owner's other patents. In the first set, Petitioner challenged U.S. Patent Nos. 7,790,869 and 8,088,575 ("the '869 patent" and "the '575 patent," respectively), two patents in the same family as the '380 patent at issue here, as well as U.S. Patent No. 7,713,698. Pet. 75–76; Paper 4, 2. The Board held all challenged claims of those patents unpatentable over much of the same art asserted here (*see* IPR2012-00007, Paper 140 (Ex. 1021); IPR2012-00006, Paper 128 (Ex. 1022); IPR2013-00011, Paper 130 (Ex. 1023)); and the Federal Circuit affirmed that judgment (*see Trustees of Columbia Univ. in the City of New York v. Illumina, Inc.*, 620 F. App'x. 916 (Fed. Cir. 2015) (Ex. 1029)). Pet. 75–76; Paper 4, 2.

In the second set, Petitioner challenged U.S. Patent Nos. 9,718,852; 9,719,139; 9,708,358; 9,725,480; and 9,868,985 ("the '985 patent") in IPR2018-00291; IPR2018-00318; IPR2018-00322; IPR2018-00385; IPR2018-00797, respectively (collectively, "the Allyl Claim IPRs"). Pet. 74–75; Paper 4, 1–2; Prelim. Resp. 1 n.1. The Board held all challenged claims of those patents unpatentable over much of the same art asserted here (*see* Exs. 1024, 1028), and Patent Owner has appealed those decisions (*see* Pet. 74–75; Paper 4, 1–2; Prelim. Resp. 1 n.1).

Petitioner points out that the Board previously held claim 1 of the '985 patent unpatentable over Tsien[1] in view of Prober;[2] claim 2 unpatentable over Tsien in view of Prober and Pallas;[3] and claims 1 and 2 unpatentable over Dower[4] in view of Prober and Metzker.[5] Pet. 75 (citing Ex. 1028). Petitioner relies on these same references in this proceeding. *Id.* at 10. Petitioner argues that claim 1–4 of the '985 patent "are nearly identical to claims 1–4 of the '380 patent." *Id.* at 75. Petitioner asserts, and we agree, that the only difference between the unpatentable claim 1 of the '985 patent and the claims of the '380 patent is that the latter "excludes an allyl capping group (which the Board determined was unpatentable in the last round of IPRs)." *Id.*; *compare* Ex. 1005, claims 1–4, *with* Ex. 1020, claims 1 and 2.

B. The '380 Patent

The '380 patent issued from an application that is a child of a series of applications having essentially the same specification. *See* Ex. 1005, code (60). Some of those applications matured into patents, including the '575 and '869 patents, which Petitioner previously challenged in IPR2012-00007 and IPR2013-00011, respectively.

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[1] Tsien, WO 91/06678, published May 16, 1991 (Ex. 1031).
[2] Prober et al., *A System for Rapid DNA Sequencing with Fluorescent Chain-Terminating Dideoxynucleotides*, 238 SCIENCE 336–41 (1987) (Ex. 1041).
[3] Pallas et al., WO 98/53300, published Nov. 26, 1998 (Ex. 1137).
[4] Dower et al., U.S. Patent 5,547,839, issued Aug. 20, 1996 (Ex. 1030).
[5] Metzker et al., *Termination of DNA Synthesis by Novel 3'-Modified-Deoxyribonucleoside 5'-Triphosphates*, 22 NUCLEIC ACIDS RES. 4259–67 (1994) (Ex. 1039).

The ’380 patent “provides methods for attaching a nucleic acid to a solid surface and for sequencing nucleic acid by detecting the identity of each nucleotide analog after the nucleotide analog is incorporated into a growing strand of DNA in a polymerase reaction.” Ex. 1005, Abstract. It also “provides nucleotide analogues which comprise unique labels attached to the nucleotide analogue through a cleavable linker, and a cleavable chemical group to cap the –OH group at the 3'-position of the deoxyribose.” *Id.*

The ’380 patent acknowledges several prior-art methods for DNA sequencing, including capillary sequencing (a version of the Sanger sequencing method, *see* Ex. 1141 ¶ 49), and sequencing by synthesis (“SBS”). Ex. 1005, 1:60–65, 2:20–24. According to the ’380 patent, the concept of SBS was first introduced in 1988 and “involves detecting the identity of each nucleotide as it is incorporated into the growing strand of DNA in a polymerase reaction.” *Id*. at 2:20–24.

The ’380 patent states that both the Sanger method and the prior-art SBS methods had several drawbacks, and needed to be improved. *See, e.g.*, *id*. at 2:2–19, 41–46, 2:53–3:3. The ’380 patent discloses that

> The approach disclosed [therein] is to make nucleotide analogues by linking a unique label such as a fluorescent dye or a mass tag through a cleavable linker to the nucleotide base or an analogue of the nucleotide base, such as to the 5-position of the pyrimidines (T and C) and to the 7-position of the purines (G and A), to use a small cleavable chemical moiety to cap the 3'-OH group of the deoxyribose to make it nonreactive, and to incorporate the nucleotide analogues into the growing DNA strand as terminators. Detection of the unique label will yield the sequence identity of the nucleotide. Upon removing the label and

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