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Paper 67
Entered: June 21, 2018

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ILLUMINA, INC.,
Petitioner,

v.

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

Case IPR2018-00291 (Patent 9,718,852 B2)
Case IPR2018-00318 (Patent 9,719,139 B2)
Case IPR2018-00322 (Patent 9,708,358 B2)
Case IPR2018-00385 (Patent 9,725,480 B2)[1]

Before JAMES A. WORTH, MICHELLE N. ANKENBRAND, and BRIAN D. RANGE, *Administrative Patent Judges.*

Opinion for the Board *per curiam*.
Opinion Dissenting filed by Administrative Patent Judge WORTH.

Per curiam

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[1] The proceedings have not been consolidated. The parties are not authorized to use a combined caption unless an identical paper is being entered into each proceeding and the paper contains a footnote indicating the same.

FINAL WRITTEN DECISION
35 U.S.C. § 318(a) and 37 C.F.R. § 42.73

I. INTRODUCTION

This is a Final Written Decision addressing four *inter partes* reviews challenging each claim of U.S. Patent Nos. 9,718,852 B2 ("the '852 patent"), 9,719,139 B2 ("the '139 patent"), 9,708,358 B2 ("the '358 patent"), and 9,725,480 B2 ("the '480 patent"). We have jurisdiction under 35 U.S.C. § 6. For the reasons that follow, we determine that Illumina, Inc. ("Petitioner" or "Illumina") demonstrates, by a preponderance of the evidence, that the challenged claims are unpatentable.

A. Procedural History

Petitioner filed four Petitions (Paper 1,[2] "Pet.") requesting an *inter partes* review of the '852 patent, the '139 patent, the '358 patent, and the '480 patent. We instituted trial on the following grounds:[3]

Patent	References	Basis	Claim Challenged
'852	Tsien,[4] Prober[5]	§ 103(a)	1

[2] Unless this opinion otherwise indicates, all citations are to IPR2018-00291 ("the '291 IPR").

[3] *See* IPR2018-00291, Paper 16 (June 25, 2018); IPR2018-00318, Paper 16 (July 2, 2018); IPR2018-00322, Paper 16 (July 2, 2018); IPR2018-00385, Paper 20 (July 26, 2018).

[4] Tsien et al., WO 91/06678, May 16, 1991 ("Tsien") (Ex. 1013).

[5] James M. Prober et al., *A System for Rapid DNA Sequencing with Fluorescent Chain-Terminating Dideoxynucleotides*, 238 SCIENCE 336–341 (Oct. 16, 1987) ("Prober") (Ex. 1014).

Patent	References	Basis	Claim Challenged
'852	Dower,[6] Prober, Metzker[7]	§ 103(a)	1
'139	Tsien	§ 103(a)	1
'139	Dower, Prober, Metzker	§ 103(a)	1
'358	Tsien	§ 103(a)	1
'358	Dower, Prober, Metzker	§ 103(a)	1
'480	Tsien, Prober	§ 103(a)	1
'480	Dower, Prober, Metzker	§ 103(a)	1

After institution, the Trustees of Columbia University in the City of New York ("Patent Owner" or "Columbia") filed identical Patent Owner Responses in each of the four *inter partes* proceedings. *See* Patent Owner's Response ("Resp."), Paper 31 (public version), Paper 34 (sealed version); Patent Owner's Surreply ("Surreply"), Paper 49. Petitioner filed substantively similar Reply Briefs in each of the four cases. IPR 2018-00291, Paper 45; IPR 2018-00318, Paper 47; IPR 2018-00322, Paper 45; IPR 2018-00385, Paper 44. Additionally, Petitioner filed a motion to exclude evidence (Paper 53, "Mot. Excl."), Patent Owner responded (Paper 56, "Opp. Mot. Excl."), and Petitioner provided a Reply brief (Paper 58).

We heard oral argument for the four *inter partes* review (as well as for related IPR2018-00797) on March 5, 2019, and a transcript of the hearing is

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[6] Dower et al., U.S. Patent No. 5,547,839, Aug. 20, 1996 ("Dower") (Ex. 1015).

[7] Michael L. Metzker et al., *Termination of DNA synthesis by novel 3'-modified-deoxyribonucleoside* 5'*-triphosphates*, 22(20) NUCLEIC ACIDS RESEARCH 4259–67 (1994) ("Metzker") (Ex. 1016).

part of the record of each proceeding. Paper 62 ("Transcript"). After oral argument, we requested additional briefing regarding certain estoppel issues. Paper 61. The parties provided such briefing. Papers 63 (Illumina's Supplemental Brief Regarding Estoppel ("Pet. Supp. Br.")), 64 (Patent Owner's Additional Brief ("PO Supp. Br.)), 65 (Illumina's Supplemental Reply Regarding Estopel ("Pet. Supp. Reply")), 66 (Patent Owner's Reply to Petitioner's Supplemental Brief ("PO Supp. Reply")).

B. Related Proceedings

The parties indicate that the '852 patent, '139 patent, '358 patent, and '480 patent are the subject of the following district court proceeding involving Petitioner and Patent Owner: *Trustees of Columbia University v. Illumina, Inc.*, Case No. 17-cv-973-GMS (D. Del.). Pet. 74–75; Paper 4, 1.

On March 16, 2018, Petitioner filed a Petition requesting an *inter partes* review of related U.S. Patent No. 9,868,985 B2. IPR2018-00797, Paper 1. We address that Petition in a separate decision.

The parties note that in IPR2012-00006, IPR2012-00007, and IPR2013-00011, the Board found unpatentable the challenged claims of Patent Owner's U.S. Patent Nos. 7,713,698; 7,790,869; and 8,088,575. Pet. 74–75; Paper 4, 1; *see* Ex. 1006; Ex. 1005; Ex. 1007; Ex. 1008 (Federal Circuit decision affirming these Board decisions). In IPR2013-00128 and IPR2013-00266, the Board found unpatentable the challenged claims of Petitioner's U.S. Patent Nos. 7,057,026 and 8,158,346. Pet. 76; *see* Ex. 1048; Ex. 1049; Ex. 1050 (Federal Circuit decision affirming these Board decisions). In IPR2013-00517, the Board held that Intelligent Bio-Systems, Inc. failed to demonstrate that the challenged claims of Petitioner's

U.S. Patent No. 7,566,537 ("the '537 patent") were unpatentable.[8] Pet. 76–77; *see* Ex. 1044; Ex. 1045 (Federal Circuit decision affirming this Board decision).

C. *The '852, '139, '358, and '480 Patents*

As to technical substance, only the claims of the '852, '139, '358, and '480 patents differ. For ease of discussion, we refer to the Specification of the '852 patent. The '852 patent is titled "Massive Parallel Method for Decoding DNA and RNA" and relates to a "system for DNA sequencing by the synthesis approach which employs a stable DNA template, which is able to self prime for the polymerase reaction, covalently linked to a solid surface such as a chip, and 4 unique nucleotides analogues." Ex. 1001, 4:25–30.

The '852 patent discloses that electrophoresis was a bottleneck for high-throughput DNA sequencing and mutation detection projects. *Id.* at 2:15–18. It was known to perform sequencing without electrophoresis, using a chip format and laser-induced fluorescent detection for DNA sequencing. *Id.* at 2:19–26. The '852 patent discloses that "[l]ong stretches of the same bases cannot be identified unambiguously with [a] pyrosequencing method." *Id.* at 2:44–46. The '852 patent also describes limited success in the prior art for the incorporation of 3'-modified nucleotides by DNA polymerase. *Id.* at 2:52–53.

> The approach disclosed in the '852 patent 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

[8] A third party also challenged the '537 patent in Cases IPR2017-02172 and IPR2017-02174, but the Board denied institution in each case. Pet. 80; Paper 10, 1.

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