

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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ILLUMINA, INC.,  
Petitioner,

v.

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

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Case IPR2018-00322  
Patent 9,708,358

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**COLUMBIA'S EXHIBIT LIST NO. 4 UNDER 37 C.F.R. § 42.63(e)**

**COLUMBIA’S EXHIBIT LIST NO. 4 UNDER 37 C.F.R. § 42.63(e)**

Pursuant to 37 C.F.R. § 42.63(e), Columbia hereby submits a current list of exhibits.

<b>Exhibit No.</b>	<b>Description</b>
2001	Declaration of Robert S. Schwartz in Support of Patent Owner’s Motion for Admission Pro Hac Vice Under 37 C.F.R. §42.10
2002	U.S. Patent No. 7,790,869
2003	U.S. Patent No. 7,713,698
2004	U.S. Patent No. 8,088,575
2005	Exhibit number not used.
2006	Excerpts from the Prosecution History of U.S. Patent No. 9,725,480 not included in Ex-1038
2007	IPR2013-00517, Ex. 2011, Declaration of Floyd Romesberg, Ph.D. (May 5, 2014)
2008	IPR2013-00517, Paper 32, Illumina’s Patent Owner Response (May 5, 2014)
2009	Excerpts from the <i>Ex Parte</i> Reexamination History of U.S. Patent No. 5,808,045
2010	Assignment data in connection with U.S. Patent No. 5,808,045
2011	PCT Publication WO 98/33939 (“Anazawa”) (English translation)
2012	Metzker, et al., “Elimination of Residual Natural Nucleotides from 3’-O-Modified-dNTP Syntheses by Enzymatic Mop-Up,” <i>BioTechniques</i> , 25:814-817 (1998)

2013	PCT Publication WO 00/53805
2014	Metzker, et al., “Stop-Start DNA Synthesis in the Base Addition Sequencing Scheme (BASS),” Genome Mapping & Sequencing (1994)
2015	U.S. Patent No. 7,541,444
2016	U.S. Patent No. 7,771,973
2017	U.S. Patent Application Publication No. 2007/0166705
2018	Boons, et al., “A New Procedure for the Isomerisation of Substituted and Unsubstituted Allyl Ethers of Carbohydrates,” Chemical Communications, 141-142 (1996)
2019	Ochiai, et al., “Hypervalent ( <i>tert</i> -Butylperoxy)iodanes Generate Iodine-Centered Radicals at Room Temperature in Solution: Oxidation and Deprotection of Benzyl and Allyl Ethers, and Evidence for Generation of $\alpha$ -Oxy Carbon Radicals,” J. Am. Chem. Soc., 118:7716-7730 (1996)
2020	Olivero & Dunach, “Nickel-catalysed Electrochemical Reductive Deprotection of Allyl Ethers,” J. Chem. Soc., Chem. Commun., 2497-2498 (1995)
2021	U.S. Patent No. 6,232,465
2022	Excerpts from the <i>Ex Parte</i> Reexamination History of U.S. Patent No. 6,232,465
2023	Solexa, Inc.’s Fed. R. Civ. P. 7.1 Statement (Feb. 19, 2010)
2024	Solexa, Inc.’s Schedule 13D-A Submission to the United States Securities and Exchange Commission (Feb. 2, 2007)
2025	Litosh, et al., “Improved nucleotide selectivity and termination of 3’-OH unblocked reversible terminators by molecular tuning of 2-nitrobenzyl alkylated HOMedU triphosphates,” Nucleic Acids Research, 39:1-13 (2011)
2026	IPR2017-02172, Paper 6, Preliminary Response of Patent Owner Illumina Cambridge Ltd. (January 23, 2018)

2027	IPR2017-02174, Paper 6, Preliminary Response of Patent Owner Illumina Cambridge Ltd. (January 23, 2018)
2028	U.S. Patent No. 7,566,537
2029	No. 2015-1123 (CAFC), Brief of Patent Owner-Appellant Illumina Cambridge Ltd., D.I. 27 (March 10, 2015)
2030	IPR2013-00266, Paper 39, Patent Owner Illumina's Reply to Petitioner's Opposition to Illumina's Motion to Amend (March 21, 2014)
2031	Canard & Sarfati, "DNA polymerase fluorescent substrates with reversible 3'-tags," <i>Gene</i> , 148:1-6 (1994)
2032	IPR2013-00517, Paper 84, Oral Hearing Transcript (February 2, 2015)
2033	IPR2013-00517, Paper 64, Illumina's Motion for Observations on the Cross-Examination Testimony of Bruce Branchaud, Ph.D. and Michael Metzker, Ph.D. (September 2, 2014)
2034	IPR2012-00007, Paper 5, Petition for <i>Inter Partes</i> Review of U.S. Pat. No. 7,790,869 (September 16, 2012)
2035	IPR2013-00517, Exhibit 1025, Deposition of Floyd Romesberg, Ph.D. (July 28, 2014)
2036	IPR2012-00007, Paper 38, Decision on Petition for <i>Inter Partes</i> Review (March 12, 2013)
2037	Assignment data in connection with U.S. Patent Application Publication No. 2007/0166705 and U.S. Patent No. 7,541,444
2038	Assignment data in connection with U.S. Patent No. 6,232,465
2039	PCT Publication WO 98/33939 (Japanese language version of Anazawa)
2040	Translation Affidavit for Anazawa
2041	Welch & Burgess, "Synthesis of fluorescent, photolabile 3'-O-protected nucleoside triphosphates for the base addition sequencing scheme," <i>Nucleosides &amp; Nucleotides</i> , 18:197-201 (1999)

2042	IPR2013-00517, Paper 68, Illumina's Opposition to IBS Motion To Exclude Evidence
2043	Excerpts from the Prosecution History of U.S. Patent No. 7,771,973
2044	Exhibit number not used.
2045	Excerpts from the Prosecution History of U.S. Patent No. 9,708,358 not included in Ex-1065
2046	Froehler, et al. "Oligodeoxynucleotides Containing C-5 Propyne Analogs of 2'-Deoxyuridine and 2'-Deoxycytidine," Tetrahedron Letters, 33:5307-5310 (1992)
2047	Exhibit number not used.
2048	Exhibit number not used.
2049	Exhibit number not used.
2050	Declaration of Zachary L. Garrett in Support of Patent Owner's Motion for Admission <i>Pro Hac Vice</i> Under 37 C.F.R. § 42.10
2051	Exhibit number not used.
2052	Exhibit number not used.
2053	Metzker "Sequencing technologies – the next generation," Nature Review, 11(1):31-46 (2010)
2054	Ronaghi, et al. "A sequencing method based on real-time pyrophosphate," Science, 281(5375):363-365 (1998)
2055	Genomeweb, "Illumina Closes Solexa Acquisition," January 26, 2007
2056	Exhibit number not used.
2057	Lindahl, "Instability and decay of the primary structure of DNA," Nature, 362:709-715 (1993)

2058	Exhibit number not used.
2059	Johnson, "Rapid Quench Kinetic Analysis of Polymerases, Adenosinetriphosphatases, and Enzyme Intermediates," Methods in Enzymology, 249:38-61 (1995)
2060	Exhibit number not used.
2061	Exhibit number not used.
2062	Exhibit number not used.
2063	Exhibit number not used.
2064	Exhibit number not used.
2065	Excerpts from the <i>Ex Parte</i> Reexamination History of U.S. Patent No. 6,232,465
2066	Curriculum Vitae of Steven M. Menchen, Ph.D.
2067	Exhibit number not used.
2068	Exhibit number not used.
2069	Exhibit number not used.
2070	Exhibit number not used.
2071	Exhibit number not used.
2072	Exhibit number not used.
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2074	Exhibit number not used.
2075	Exhibit number not used.
2076	Exhibit number not used.
2077	Exhibit number not used.
2079	Exhibit number not used.
2080	IPR2013-00128, Exhibit 1033, Deposition of Floyd Romesberg, Ph.D. (January 14, 2014)
2081	IPR2013-00266, Exhibit 2037, Second Declaration of Floyd Romesberg, Ph.D. (March 21, 2014)
2082	IPR2013-00266, Exhibit 1042, Deposition of Floyd Romesberg, Ph.D. (April 10, 2014)
2083	IPR2013-00128, Substitute Exhibit 2009, Substitute Declaration of Floyd Romesberg, Ph.D. in Support of Patent Owner's Motion to Amend (February 19, 2014)
2084	Jannasch, "Deep sea hydrothermal vents: underwater oases," The NEB Transcript (1992)
2085	Levine, et al. "The relationship of structure to the effectiveness of denaturing agents for deoxyribonucleic acid," Biochem., 2(1):168-175 (1963)
2086	Kit, "Deoxyribonucleic acids," Annu. Rev. Biochem., 32:43-82 (1963)
2087	Lindahl & Nyberg, "Rate of Depurination of Native Deoxyribonucleic Acid," Biochem., 11(19):3610-3618 (1972)
2088	Exhibit number not used.
2089	Hamed et al., "Palladium(II)-Catalyzed Oxidation of Aldehydes and Ketones. 1. Carbonylation of Ketones with Carbon Monoxide Catalyzed by Palladium(II) Chloride in Methanol," J. Org. Chem., 66(1):180-185 (2001)

2090	Exhibit from Deposition of Dr. Floyd Romesberg, September 19-20, 2018, in IPR2018-00291, -00318, -00322, and -00385 (Handwritten calculations)
2091	Exhibit number not used.
2092	Exhibit number not used.
2093	Exhibit number not used.
2094	Pillai & Nandi, "Interaction of Palladium (II) With DNA," <i>Biochimica et Biophysica Acta</i> , 474:11-16 (1977)
2095	U.S. Patent No. 6,664,079
2096	Transcript for the Deposition of Dr. Floyd Romesberg, September 19-20, 2018, in IPR2018-00291, -00318, -00322, and -00385 (ORIGINAL TRANSCRIPT)
2097	Qian et al., "Chemoenzymatic synthesis of $\alpha$ -(1 $\rightarrow$ 3)-Gal(NAc)-terminating glycosides of complex tertiary sugar alcohols," <i>J. Am. Chem. Soc.</i> 121:12063-12072 (1999)
2098	Kang, "Complete reverse regioselection in Wacker oxidation of acetonides and cyclic carbonates of allylic diols," <i>J. Org. Chem.</i> 60:4678-4679 (1995)
2099	U.S. Patent No. 5,858,671
2100	U.S. Patent No. 6,013,445
2101	Tsuji, et al., "Regioselective oxidation of internal olefins bearing neighboring oxygen functions by means of palladium catalysts," <i>Tetrahedron Letters</i> , 23(26):2679-2682 (1982)
2102	Qian, "Enzymatic and Chemical Synthesis of Oligosaccharide Analogs," Thesis, University of Alberta (2000)
2103	Project Information for Dr. Romesberg NIH Grant, "Evolving Novel Polymerases for Genome Sequencing"
2104	Genomeweb, "Helicos and Columbia to Test Scripps' Improved Polymerase for Next-Gen Sequencing," October 3, 2006



2105	Bieg et al., "Isomerization and cleavage of allyl ethers of carbohydrates by trans-[Pd(NH <sub>3</sub> ) <sub>2</sub> Cl <sub>2</sub> ]," J. Carbohydrate Chem., 4(3):441-446 (1985)
2106	Ochiai, "Hypervalent (tert-butylperoxy) iodanes generate iodine-centered radicals at room temperature in solution," J. Am. Chem. Soc., 118:7716-7730 (1996)
2107	Katritzky, "The origins of the benzotrizole project, its versatility illustrated by a new --C=CHCH+OEt synthon, and novel synthesis of alpha beta-unsaturated aldehydes and ketones, furans, pyrroles and allyl ethers," Synthesis, 1315-1323 (1995)
2108	Documents Considered By Dr. Menchen For Exhibit 2116
2109	WO 96/27025
2110	WO 96/23807
2111	Martinez et al., "Acyclic nucleoside triphosphate analogs as terminators in biocatalytic DNA replication," Bioorganic & Medicinal Chemistry Letters, 7(23):3013-3016 (1997)
2112	Hawley's Condensed Chemical Dictionary, Thirteenth Edition (1997) (excerpts)
2113	Transcript for the Deposition of Dr. Floyd Romesberg, October 9, 2018, in IPR2018-00797
2114	Exhibit number not used.
2115	Parshall, "Homogeneous Catalysis, the Applications and Chemistry of Catalysis by Soluble Transition Metal Complexes," John Wiley and Sons (1980) (excerpts)
2116	Declaration of Steven M. Menchen, Ph.D., October 26, 2018 (IPR2018-00291, -00318, -00322, and -00385)
2117	IPR2017-02172, Paper 22, Decision Denying Petitioner's Request for Rehearing (August 2, 2018)
2118	Dr. Romesberg NIH Grant, "Evolving Novel Polymerases for Genome Sequencing"

2119	Solexa, Inc.'s Form 425 Submission to the United States Securities and Exchange Commission (November 14, 2006)
2120	Internal Solexa Email (SEALED and PUBLIC versions)
2121	Internal Illumina Email (SEALED and PUBLIC versions)
2122	Internal Illumina Email (SEALED and PUBLIC versions)
2123	Attachment to Ex. 2122 (SEALED and PUBLIC versions)
2124	Attachment to Ex. 2122 (SEALED and PUBLIC versions)
2125	Eckert et al., "DNA Polymerase Fidelity and the Polymerase Chain Reaction," Genome Research, 1:17-24 (1991)
2126	Transcript for the Deposition of Dr. Floyd Romesberg, September 19-20, 2018, in IPR2018-00291, -00318, -00322, and -00385 (REVISED TRANSCRIPT)
2127	Proposed Standing Protective Order
2128	Protective Order in D.Del. C.A. No. 17-973 (GMS)

Respectfully submitted,

Dated: October 26, 2018

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**CERTIFICATE OF SERVICE**

I hereby certify that a computer disk containing a true and correct copy of the foregoing **COLUMBIA'S EXHIBIT LIST NO. 4 UNDER 37 C.F.R. § 42.63(e)** is being served on October 26, 2018, via Federal Express overnight mail to Counsel for Petitioner at:

Knobbe, Martens, Olson, & Bear, LLP  
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Dated: October 26, 2018

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