

Recent patent applications in single-molecule technologies

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Over the last 10 years, single-molecule research and nano-biosensor tools have emerged as a new class of analytical and ultra-sensitive technology for the design of next-generation methods capable of identifying and discriminating between individual molecules. A panel of inventions in this field recently disclosed to patent offices worldwide by biotechnology companies and public research agencies is detailed herein (Table 1).

The ambitious goal of sequencing individual human genomes for about \$1,000 apiece is likely to be achieved within the next few years. One of the best candidates is the nanopore platform, whose ability to detect and manipulate chemical and molecular entities (such as nucleic acids) at a very-high-resolution, or 'single-molecule', level is one of the bridges linking together chemistry, nanomaterial science, cellular and molecular biology and

biophysics. This promises to have a considerable impact on biotechnology, with clear applications for the real world.

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COMPETING FINANCIAL INTERESTS

The author declares no competing financial interests.

Table 1 Recent patent applications in single-molecule technologies

Patent number	Description	Assignee	Inventor	Priority application date	Publication date
US 2011249259	Methods and apparatus for single-molecule sensing and molecular analysis of analytes (nucleic acids, proteins, polypeptides, peptides, lipids and polysaccharides) by optical spectroscopy in solid-state nanopores in a transmission-based approach.	Louvain Catholic University (Louvain, Belgium), IMEC (Louvain, Belgium)	Van Dorpe P, De Vlamincck I, Lagae L, Borghs G	12/9/2008	10/13/2011
US 2011212437	Single-molecule sequencing with two distinct chemistry steps.	Pacific Biosciences (Menlo Park, CA, USA)	Emig R, Jia L, Hanes J, Sebo L	2/18/2010	9/1/2011
US 2011200989, WO 2011091043	Single-molecule nucleic acid sequencing using multiphoton fluorescence excitation.	Life Technologies (Carlsbad, CA, USA)	Janaway GA, Inman CE, Beechem J	1/19/2010	7/28/2011
US 20110177496	Compositions, methods and apparatus for DNA sequencing in a two-electrode chamber by field-switch sequencing.	Pacific Biosciences (Menlo Park, CA, USA)	Williams JGK, Anderson JP	4/30/2004	7/21/2011
US 2009029477, US 7972858	Methods for analyzing polymer molecules and high-throughput readout of DNA and RNA molecules with single-molecule sensitivity.	Harvard College (Cambridge, MA, USA)	Mathe J, Meller A, Eid JS	8/13/2004	7/5/2011
US 20110160078	Digital counting of individual molecules by stochastic attachment of diverse labels.	Affymetrix (Santa Clara, CA, USA)	Fodor S, Fu GK	12/15/2009	6/30/2011
WO 2011047680	Immunochemical detection, visualization and quantification of single unit of biological or chemical targets.	Dako (Glostrup, Denmark)	Lohse J	10/20/2009	4/28/2011
US 2009159812, US 7914734	Electromagnetic radiation-based scanning analyzer for single-molecule detection and methods of use for diagnostics with zero carryover between samples.	Singulex (Alameda, CA, USA)	Livingston RA	12/19/2007	3/29/2011
US 2011053286	An apparatus and improved method for detecting and monitoring (bio)-chemical reactions or interactions at the single-molecule level.	Life Technologies (Carlsbad, CA, USA)	Battulga N, Reddy M, Hardin SH	7/20/2006	3/3/2011
US 2011021383	Apparatuses for real-time RNA or DNA single-molecule sequence determination.	Life Technologies (Carlsbad, CA, USA)	Hardin S, Briggs J, Tu S-C, Gao X, Willson R	7/7/2000	1/27/2011
WO 2009065635	Single cell-based reporter assay to monitor gene expression patterns with a rapid and high spatiotemporal resolution.	Pasteur Institut (Paris)	Mhlanga M, Enninga J, Sansonetti P, Nehrass U	9/12/2007	5/28/2009

Source: US Patent and Trademark Office, Espacenet, JP and EP patent offices. The status of each application is slightly different from country to country.

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