

James M. Tsay, Ph. D.

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Summary

Multidisciplinary and Integrative Scientific Manager specializing in end-to-end product development spanning from research to product launch. Strategic technology leader with 14 years of biotech industry experience in both large company and startup settings

Specialized Skills

- Next generation sequencing (NGS) research and product development leadership
Product Launches include: Illumina HiSeqX, NovaSeq, and NextSeq1000/2000
- Scientific/engineering program and functional management including integrated platforms, consumable, reagent, and application projects
- Technical R&D experience involving complex instrumentation, surface chemistry, consumables, reagents, and assay development on multiple diagnostics platforms
- Surface chemistry and bioconjugation of flow cells, nanoparticles, microbeads, well plates
- Characterization with high resolution imaging, single molecule, infrared, and fluorescence correlation spectroscopy (FCS), fluorimetry, optical tweezers, TEM, and X-ray Diffraction

Education/Training

University of California at San Diego	Executive Perspective for Scientists & Engineers	2018
University of California at San Diego	Postdoctoral Fellow, Biophysics Research	2006-2011
University of California at Los Angeles	Ph.D. Chemistry	2001-2006
University of California at Berkeley	B.S. Chemistry, Minor in Physics	1997-2001

Industrial Experience

Jan 2023- present: Head of Systems Integration/Sr. Director at Pleno

- Core Team Lead for the RAPTOR multi-omic platform including an instrument, consumables, reagents, and applications
- Systems Integration functional lead: Managed the integration, characterization, and improvements for a fleet of 17 prototype instruments in 2 phases (Proto 1 and 2)
- Completed early access program for RAPTOR platform in collaboration with BioLegend
- Instituted PDP "lite" for startup to accomplish product development goals

July 2020- Jan 2023: Associate Director at Illumina

- Core Team Lead for NextSeq1000/2000 consumables extension program (P1, 2X300 kits) and program architect for subsequent program to launch P4 and X-LEAP SBS kits
- Technical Module team leader guiding research project to development transfer goals
- Functional team leader (Chemistry Interfaces) with Surface chemistry and Biophysics
- Strategy team leader for Flow cell and Reagent Clustering areas

April 2019 – July 2020: Senior Staff Scientist at Illumina

- Core Team member on NextSeq1000/2000 project (Flow cell representative)

- Surface Chemistry Strategy Team leader for ILMN Consortium including Research/Tech Dev, Development, and Ops groups

December 2016 – April 2019 Illumina: Staff Scientist

- Core Team member on NextSeq1000/2000 project (Flow cell)
- Technical lead of NovaSeq Flow cell chemistry and functional integration program
- Functional Manager of 5 direct reports
- Technical manager of 50 Scientists and Engineers

July 2014-December 2016 Illumina: Senior Scientist

- Technical lead of robustness program for the HSX platform (V2.5 Flow cell)
- Core team member of extension program, successfully taking product to Pilot and Transfer phase. This product was incorporated in the Genomics England project (GEL).

May 2013-July 2014 Illumina: Scientist II

- Core team member/Manager of two flow cell projects including the HiSeq X Ten platform (\$1000 genome sequencer)
- Lead of flow cell QC, Surface chemistry, and chemistry scale-up teams for patterned flow cell project
- Technical lead of Patterned FC project: surface chemistry and sequencing integration

August 2011- May 2013 Illumina: Scientist I

- Created novel methods and stream-lined assay development and QC for next generation sequencing platforms (HiSeqX)
- Surface Chemistry Research for NGS platforms: demonstrated first feasibility data of patterned FC project for HiSeqX (see patents)
- Led team for scaling up processes to functionalize flow cells for sequencing development
- Led team to bring basic research project in NGS past feasibility phase and into product development phase

Postdoctoral Research at UCSD (Advisor: Prof. Douglas E. Smith, Dept. of Physics)

- Constructed and redesigned a dual trap optical tweezers setup for the investigation of single biological motors
- Investigated the structure-function relationships of viral DNA packaging motors
- Wrote and was awarded funding for an NIH postdoctoral fellowship
- Organized and cowrote an NIH R01 grant to study the genetics and biophysics of viral packaging motors which was awarded (ranked top 2%)

Graduate Research at UCLA (Advisor: Prof. Shimon Weiss, Dept. of Chemistry)

- Synthesized and characterized various nanomaterials including novel biologically compatible NIR-emitting nanocrystals and quantum-dot based drugs for photodynamic therapy applications for targeted imaging and cancer
- Created several novel conjugation strategies for biological applications of nanomaterials
- Constructed a novel polarization fluorescence correlation spectroscopy setup used for the development of an ultrasensitive immunoassay
- Studied the colloidal and fluorescence properties of nanomaterials with single molecule fluorescence techniques

Professional and Academic Honors

NIH Ruth L. Kirschstein Postdoctoral Fellowship Award (NRSA)	2008-2011
Ernest F. Hare Award for Excellence in Research	2005
Coblentz Award for Spectroscopy	2001

Selected Publications (13 total, >12,500 citations)

- J. M. Tsay**, J. Sippy, D. delToro, B. T. Andrews, B. Draper, C. E. Catalano, V. Rao, M. Feiss, and D. E. Smith, "Mutations Altering a Structurally Conserved Loop-helix-loop Region of a Viral Packaging Motor Change DNA Translocation Velocity and Processivity," *Journal of Biological Chemistry* 2010, **285** (31) 24282–24289,
- J. M. Tsay**, J. Sippy, M. Feiss, and D. E. Smith, "The Q motif of a Viral Packaging Motor Governs its Force Generation and Communicates ATP Recognition to DNA Interaction," *Proc Natl Acad Sci U S A* 2009, **106**, 14355-14360, *Track II submission*
- J. M. Tsay**, M. Trzoss, L. Shi, X. Kong, M. Selke, M. E. Jung, S. Weiss, "Singlet Oxygen Production by Peptide-coated Quantum Dot-Photosensitizer Conjugates," *J. Am. Chem. Soc.* 2007 **129** (21), 6865 – 6871
- J. M. Tsay**, S. Doose, S. Weiss, "Rotational and Translational Diffusion of Peptide Coated CdSe/CdS/ZnS Nanorods studied by Fluorescence Correlation Spectroscopy", *J. Am. Chem. Soc.* **128** (5), 1639 -1647, 2006
- S. Doose, **J. M. Tsay**, F. Pinaud, S. Weiss, "Comparison of Photophysical and Colloidal Properties of Biocompatible Semiconductor Nanocrystals Using Fluorescence Correlation Spectroscopy", *Analytical Chemistry*, 2005, **77** (7), 2235
- J. M. Tsay**, S. Doose, F. Pinaud, S. Weiss, "Enhancing the Photoluminescence of Peptide-Coated Nanocrystals with Shell Composition and UV Irradiation", *J. Phys. Chem. B*, 2005, **109**, 1669
- X. Michalet, F.F. Pinaud, L.A. Bentolila, **J. M. Tsay**, S. Doose., J.J. Li, G. Sundaresan, A.M. Wu, S.S. Gambhir, S. Weiss, "Quantum Dots for Live Cells, in vivo Imaging, and Diagnostics" *Science* 2005, **307**, 538
- J. M. Tsay**, M. Pflughoeft, L. A. Bentolila, S. Weiss, "Hybrid Approach to the Synthesis of CdTe/ZnS and CdHgTe/ZnS Nanocrystals", *J. Am. Chem. Soc.* 2004, **126** (7), 1926

Selected Patents (10 total applications)

- J. Tsay** and Yuxiang Huang "Array including sequencing primer and non-sequencing entity" European patent EP3558510B1, 2022
- J. Tsay**, et al "Flow cell package and method for making the same" US Patent 10,955,332, 2021
- S. M. Barnard, M. S. Bowen, M.C.B. Rogert, W. George, A. Brown, **J. Tsay** "Gel-Patterned surfaces" US Patent 9,512,422, 2020
- M. S. Bowen, K. L. Gundersen, S. Lin, M.C.B. Roger, K. Vijayan, Y. Wu, B. M. Venkatesan; **J. Tsay**, et al., "Microarray Fabrication System and Method" US Patent 10,280,454, 2014
- R Yang, SK Britelle, Y Cheng, SW Bailey, **JM Tsay**, Calcium Carbonate Slurry, 2022 US Patent 11,214,712
- S. Weiss, **J. M. Tsay**, S. Doose, F. Pinaud, "Peptide-Coated Nanocrystals with Graded shell Compositions". 2013 US Patent 7,943,396

Hobbies, Interests, and other skills: Guitar, composition, audio engineering, painting, traveling, Generative AI/Python for financial modeling, marketing, and competitive analysis

Github link: <https://github.com/JamesTsay-12>

References: Available upon request