

Dennis Lee Matthews, B.S., M.A., Ph.D.

Clinical Interests	<p>Dennis Matthews's is an expert in developing optically based biosensors and medical devices. Dr. Matthews is Principal Investigator and Director of the UC Davis National Science Foundation's Center for Biophotonics Science and Technology. He is also the Associate Director and Biomedical Technology Program Leader for the UC Davis Cancer Center that received NCI designation in 2002. In addition, Dr. Matthews is responsible for the development of industrial and medical applications of Lawrence Livermore National Lab (LLNL) technology, especially for the prevention, screening, diagnosis and treatment of diseases such as diabetes, stroke, brain trauma, chronic pain and cardiovascular disease.</p> <p>Dr. Matthews leads a multi-directorate center within Livermore whose mission is to develop medical devices in collaboration with industry. Current projects and those already successfully transferred to industry include: an opto-acoustic recanalization device for treating ischemic stroke; a miniature x-ray source which is mounted on a microcatheter and used to treat coronary artery restenosis; micropower impulse radar for numerous medical diagnostics, including: differentiating hemorrhagic vs. ischemic stroke; an implantable, continuous-glucose monitor; and ultra-short-pulse laser microsurgery devices.</p> <p>Dr. Matthews is widely acknowledged to have invented and developed the x-ray wavelength lasers. Among many other applications of that technology, he continues to collaborate with biologists in order to use x-ray lasers to generate x-ray images of living subcellular material, and with materials scientists to develop new methods of studying materials properties and defects. Finally, Dr. Matthews is extremely active in commercializing technologies developed at the national laboratories. He specializes in helping investors or small companies obtain the technologies needed to capture profitable new markets. He has already helped investors put together several start-up companies based on Livermore and other national lab technologies. He has broad scientific management and marketing skills, having managed programs as large as \$30M/year while at Livermore and having successfully garnered project funding from both government and private sources.</p>
Research/Academic Interests	<p>Dr. Matthews develops medical devices in particular those which use photon or electromagnetic spectrum-based technology. Current interests are focused on developing a non-invasive heart monitor for cardiac decompensation.</p>

Title Professor Emeritus

Specialty [Cancer](#), Neurological Surgery

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Department	Neurological Surgery
Division	Neurological Surgery
Center/Program Affiliation	UC Davis Comprehensive Cancer Center
Languages	French
Education	Ph.D., Atomic Physics, University of Texas, Austin, Austin TX 1974 M.A., Nuclear Physics, University of Texas, Austin, Austin TX 1972 B.S., Physics, University of Texas, Austin TX 1970
Professional Memberships	American Physical Society Institute of Electrical and Electronics Engineers Optica Society of Professional and Industrial Engineers
Honors and Awards	Recipient of Senatorial Recognition by U.S. Senator John Ensign, 2003 Recipient of the Federal Laboratory Consortium for Technology Transfer Award of Excellence, 1998 Fellow of the American Physical Society, Optical Society of America (Optica) and the SPIE, 1996 Recipient of the American Physical Society Prize for the discovery and demonstration of the first x-ray wavelength laser, 1986 Federal Laboratory Consortium Award Winner for commercializing the compact proton accelerator for radiation therapy, 1988
Select Recent Publications	Other publications of interest are available here

Gao T, Smith ZJ, Lin T, Holt DC, Lane SM, Matthews DL, Dwyre DM, Hood J, Wachsmann-Hogiu S. Smart and Fast Blood Counting of Trace Volumes of Body Fluids from Various Mammalian Species Using a Compact, Custom-Built Microscope Cytometer. *Anal Chem*. 2015;87(23):11854–11862. doi:10.1021/acs.analchem.5b03384.

Smith ZJ, Gao T, Chu K, Lane SM, Matthews DL, Dwyre DM, Hood J, Tatsukawa K, Heifetz L, Wachsmann-Hogiu S. Single-step preparation and image-based counting of minute volumes of human blood. *Lab Chip*. 2014 Aug 21;14(16):3029-36. doi: 10.1039/c4lc00567h. Epub 2014 Jun 23. PMID: 24955810.

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Awasthi S, Matthews DL, Li RA, Chiamvimonvat N, Lieu DK, Chan JW. Label-free identification and characterization of human pluripotent stem cell-derived cardiomyocytes using second harmonic generation (SHG) microscopy. *J Biophotonics*. 2012 Jan;5(1):57-66. doi:10.1002/jbio.201100077. Epub 2011 Nov 15. PMID:22083829.

Liu R, Zheng L, Matthews DL, Satake N, Chan JW. Power dependent oxygenation state transition of red blood cells in a single beam optical trap. *Applied Physics Letters*. 2011;99(4):043702-043704. doi:10.1063/1.3617467.

Lin B, Urayama S, Saroufeem RMG, Matthews DL, Demos SG. Endomicroscopy imaging of epithelial morphology using tissue autofluorescence. *J Biomed Opt*. 2011;16(4):046014. doi:10.1117/1.3565216.

Lin B, Urayama S, Saroufeem RMG, Matthews DL, Demos SG. Characterizing the origin of autofluorescence in human esophageal epithelium under ultraviolet excitation. *Opt Express*. 2010;18(20):21074-82. doi:10.1364/OE.18.021074.

Liu R, Taylor DS, Matthews DL, Chan JW. Parallel analysis of individual biological cells using multifocal laser tweezers Raman spectroscopy. *Appl Spectrosc*. 2010 Nov;64(11):1308-10. doi:10.1366/000370210793334972. PMID:21073802.

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Raman RN, Pivetti CD, Matthews DL, Troppmann C, Demos SG. A non-contact method and instrumentation to monitor renal ischemia and reperfusion with optical spectroscopy. *Opt Express*.

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2009 Jan 19;17(2):894-905. doi:10.1364/oe.17.000894. PMID:19158904.

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