Applying Lasers to Life Threatening Medical & National Security Challenges

Marcos Dantus

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CURRENT RESEARCH

Leveraging ultrafast lasers to solve challenges in medicine, homeland security, and energy

Laser technology already plays a role in devices like barcode scanners in the local grocery store and DVD players at home. Ultrafast lasers, producing pulses as short as a few millionth of a billionth of a second, are just now entering applications such as corrective eye surgery and are being used to manufacture smart phones. Prof. Dantus, University Distinguished Professor of Chemistry and Physics at Michigan State University, and his research team strive to understand and control light-matter interactions using ultrafast lasers. The fundamental findings are then leveraged to solve practical challenges such as trace detection (e.g. toxins in food or explosives) and biomedical imaging (e.g. cancer detection).

A creative scientist and inventor, Prof. Dantus co-authored 20 of the first papers on femtochemistry which earned his Ph.D. advisor, Prof. Ahmed Zewail, the Nobel Prize in 1999. Since then, his research in the field has led to 24 patents and the invention of a technology to characterize and shape laser pulses in use at the most advanced ultrafast laser laboratories around the world today.

Current research includes:

- Improving optical methods for cancer detection : Leveraging ultrafast lasers to sense chemicals present in cancer and perform a "bladeless" optical biopsy able to diagnose as well as kill cancer cells.
- Optical methods to detect explosives : Leveraging molecule-specific laser sensing technology to detect explosives, which could be used to tighten airport security or protect roadsides.
- Understanding and controlling how molecules capture energy from light : Exploring the molecular parameters required to make an...

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AFFILIATION

Michigan State University

EDUCATION

- Postdoc in 1993,California Institute of Technology
- Ph.D. in 1991,California Institute of Technology

AWARDS

- Inventor of the Year Award, 2013
- CLEO/Laser Focus World Innovation Award Winner, 2012
- Camille Dreyfus Teacher-Scholar Award, 1998
- Alfred P. Sloan Research Fellow, 1998
- Packard Fellowship for Science and Engineering, 1995
- and 2 more...

RESEARCH AREAS

Technology, Chemistry, Photonics / Imaging, Cardiovascular

FUNDING REQUEST

Your contributions will support the continued research of Prof. Marcos Dantus at Michigan State University and speed up the development and translation of practical applications. Donations will help fund 2-3 postdocs, 4-6 Ph.D. students, and 5 undergraduate students, for $70K/year, $50K/year, and $8K/year per person respectively, as well as equipment and supplies for $30K/year. Help advance laser technology in health and security; support Prof. Dantus' research.