

FOR IMMEDIATE RELEASE

Biophotonic Solutions Inc. Laser Pulse Shaping Technology Key in Spectroscopy Experiments at Michigan State University

EAST LANSING, Mich., January 8, 2015 – [Biophotonic Solutions Inc.](#) (BSI), the world leader in automated [laser pulse compression](#), announces that its “[MIIPS](#)” automated pulse compression and shaping technology is playing a key role in scientific experiments at Michigan State University (MSU), where researchers in the Dantus Research Group are using novel ultrafast laser-based spectroscopy techniques to investigate molecular dynamics. The researchers are probing solvent effects on the femtosecond dynamics of molecules, observations central to understanding light-initiated chemical reactions and biophysical processes.

“The Dantus Research Group recently published two papers where we discussed using ultrafast laser spectroscopy techniques to examine femtosecond excited-state molecular dynamics in cyanine dyes in different solvents, and a third paper on indocyanine green inside a human serum albumin protein pocket is under review,” said Dr. Marcos Dantus, professor of chemistry and physics at MSU and the founder and chief technology officer at BSI. “In each experimental setup we depended on MIIPS pulse shapers to create the precise, reproducible laser pulses critical for exploring different aspects of molecular behavior without the influence of laser pulse distortions. MIIPS technology allowed us to obtain information that would otherwise be very difficult to obtain.”

In one set of experiments, described in “Solvent Environment Revealed by Positively Chirped Pulses,” the MSU team used chirped-pulse spectroscopy to study the early excited-state response of molecules and their surrounding solvent. The experimental system used a Ti:Sapphire laser producing 26-nm bandwidth pulses, which were compressed and shaped using a BSI “MIIPS-HD” pulse shaper. The MIIPS-HD shaper instantly allowed delivering 36-fs transform-limited pulses free of high-order dispersion at the sample, and scanning from negative to positive chirp while detecting fluorescence or stimulated emission.

In another set of experiments, detailed in the paper “Electronic dephasing of molecules in solution measured by nonlinear spectral interferometry,” the team explored electronic coherence of molecules in solution. They used the same laser system as described above but the pulses were tailored by a BSI “MIIPS Box 640” pulse shaper. For these experiments, the team recorded fluorescence or stimulated emission nonlinear optical signals as a function of time delay between replica pulses generated by the pulse shaper. The pulse shaper allowed them to control time delay between the pulses with attosecond precision.

Said Dantus, “Without a pulse shaper, these experiments would involve setting up and using a complex system of optics, including mechanical stepper motors with piezoelectric transducers, with interferometric feedback to achieve delay control between pump and probe pulses with sub-femtosecond accuracy. MIIPS and adaptive optics is a simple way to instantly characterize and

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shape the laser pulses with much higher accuracy; the technology is bringing a whole new level of precision and reproducibility to these types of experiments that did not exist before.”

Originally invented by the Dantus Research Group at MSU, MIIPS is a proprietary BSI technology that provides automated ultrafast laser pulse measurement, compression, and shaping in real time, delivering optimized laser pulses to the target on demand. BSI’s latest product is “MIIPS-HD,” a pulse shaping system with enhanced pulse energy-handling capabilities over prior MIIPS systems. MIIPS-HD uses liquid crystal on silicon (LCOS) spatial light modulator (SLM) technology for diffractive pulse shaping, including independent phase and amplitude control.

For complete information on the Dantus Research Group’s recent spectroscopy experiments, please see “[Solvent Environment Revealed by Positively Chirped Pulses](#)” in *The Journal of Physical Chemistry Letters*, and “[Electronic dephasing of molecules in solution measured by nonlinear spectral interferometry](#)” in the *Journal of Spectroscopy and Dynamics*.

About Biophotonic Solutions Inc.

Biophotonic Solutions Inc. (BSI; www.biophotonicsolutions.com) is the world leader in automated, adaptive femtosecond laser pulse compression and shaping. BSI develops, licenses, and sells cost-effective solutions that drive the ultimate performance from lasers for high-precision imaging, material processing, and other applications where transform-limited ultrafast pulses are desirable at the focal plane. BSI’s products, based on exclusively licensed technology, unlock the latent power of ultrafast lasers for industrial, scientific, medical, and defense applications.

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