

Abstract Submitted
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Multimode Analysis of SHG Signal from Complex Biological Systems: Parameterization of Features Using Nearest-Neighbor Analysis and Wavelet Transforms CLAYTON BRATTON, Department of Physics, University Of California, Davis, KAREN REISER, Department of Neurological Surgery, University of California, Davis, ANDRE KNOESEN, DIEGO YANKELEVICH, Department of Electrical and Computer Engineering, University of California, Davis, ISRAEL ROCHA-MENDOZA, Cardiff School of Biosciences - Cardiff University, Cardiff, Wales, MINGSHI WANG, Department of Electrical and Computer Engineering, University of California, Davis, SHG/SFG SPECTROSCOPY TEAM — We have developed a novel computational approach for quantifying structural disorder in biomolecular lattices with nonlinear susceptibility based on analysis of polarization-modulated second harmonic signal. Transient, regional disorder at the level of molecular organization is identified using a novel signal processing algorithm sufficiently compact for near real-time analysis with a desktop computer. Global disorder within the biostructure is assessed using a two-dimensional wavelet transform of the magnitude and phase of the second harmonic signal. Selection of coefficients and the specific wavelet family is based on topological considerations. Experimental results suggest our signal processing method represents a robust, scalable tool that allows us to detect both regional and global alterations in signal characteristics of biostructures with a high degree of discrimination.

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