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Characterization and discrimination of human breast cancer and normal breast tissues using resonance Raman spectroscopy JASON SMITH, BINLIN WU, Physics Department and CSCU Center for Nanotechnology, Southern Connecticut State University, LIN ZHANG, Institute for Ultrafast Spectroscopy and Lasers, Department of Physics, The City College of the City University of New York, VICTORIA ATKIN-DAHM, Biology Department, Southern Connecticut State University, XIN GAO, Natural Sciences Department, LaGuardia Community College of the City University of New York, ROBERT ALFANO, Institute for Ultrafast Spectroscopy and Lasers, Department of Physics, The City College of the City University of New York — Worldwide breast cancer incidence has increased by more than twenty percent in the past decade. It is also known that in that time, mortality due to the affliction has increased by fourteen percent. Using optical-based diagnostic techniques, such as Raman spectroscopy, has been explored to increase diagnostic accuracy in a more objective way along with significantly decreasing diagnostic wait-times. In this study, Raman spectroscopy with 532-nm excitation was used to incite resonance effects to enhance Stokes scattering from unique biomolecular vibrational modes. Seventy-two Raman spectra (41 cancerous, 31 normal) were collected from nine breast tissue samples. Nonnegative matrix factorization (NMF) was employed to extract characteristic spectra from the processed data for characterization. The resulting cross-validation using two selective feature components resulted in discriminative sensitivity, specificity and accuracy of 92.6%, 100% and 96.0% respectively.

Jason Smith
Southern Connecticut State University

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