The Department of Chemistry and Biochemistry

Seminar Series

Presents a Seminar Titled:

"Identification of Fugitive Organic Colorants in Historic Oil Paintings Using Surface-Enhanced Raman Spectroscopy"

Presented By

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The unambiguous and ultrasensitive detection of natural, organic colorants in aged paint is a substantial analytical challenge. Surface-enhanced Raman scattering (SERS) spectroscopy is increasingly applied to the identification of organic colorants in cultural heritage objects since vibrational fingerprints can be measured from microscopic samples. In collaboration with the Colonial Williamsburg Foundation, we have developed novel strategies for the identification of red and blue organic pigments in historic oil paintings and paint surfaces. Correlated SERS and fluorescence microscopy measurements on single pigment grains are used to identify carmine lake in two 18th century oil paintings, the *Portrait of Isaac Barré* and *Portrait of William Nelson*. Sample pretreatment with sulfuric acid enabled the SERS-based identification of insoluble indigo, Prussian blue, and mixtures thereof, in aged painted surfaces. For example, a microscopic H_2SO_4-treated sample from the *Portrait of Evelyn Byrd* produced a SERS spectrum that is consistent with a mixture of Prussian blue and indigo. To our knowledge, this work represents the first simultaneous detection of blue organic and inorganic colorants in paint using SERS. In light of these observations, the advantages and future challenges for SERS-based analysis of art objects is discussed.

Thursday, October 10, 2013 at 12:20 p.m. in BAL 1012