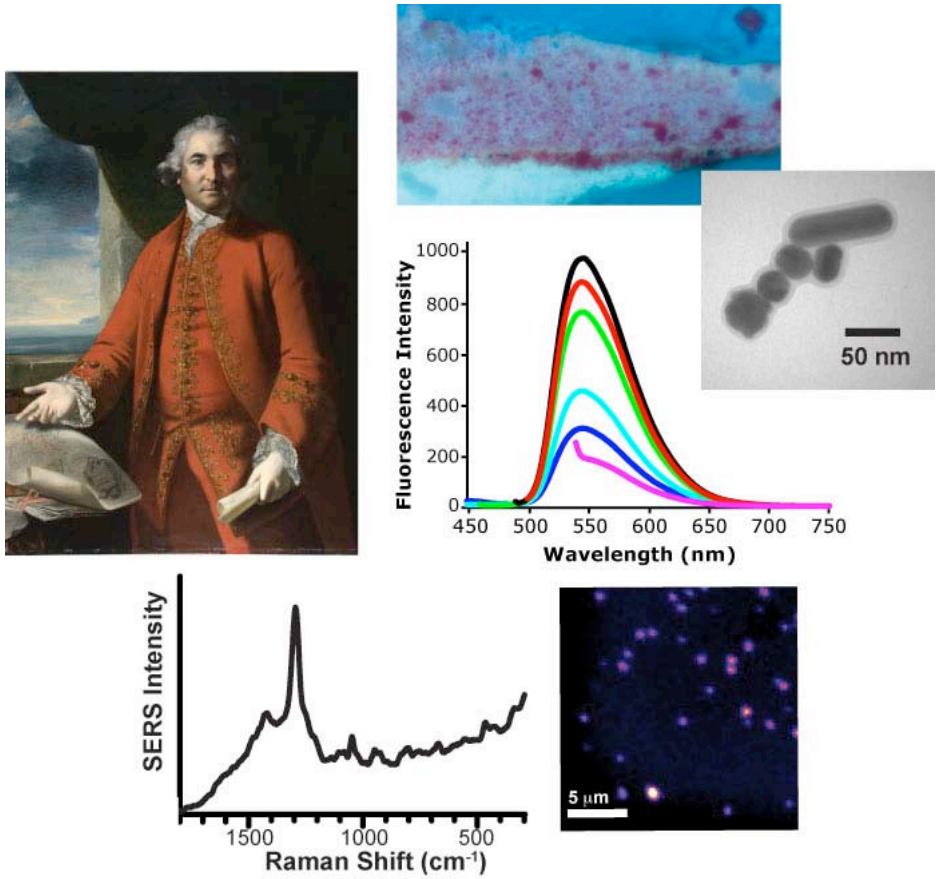
Wustholz Research Group:
Applying Laser Spectroscopy to Problems in Art Conservation and Solar Energy Conversion



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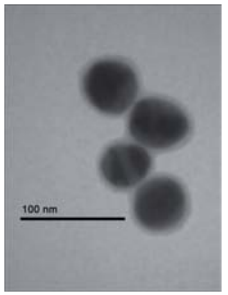
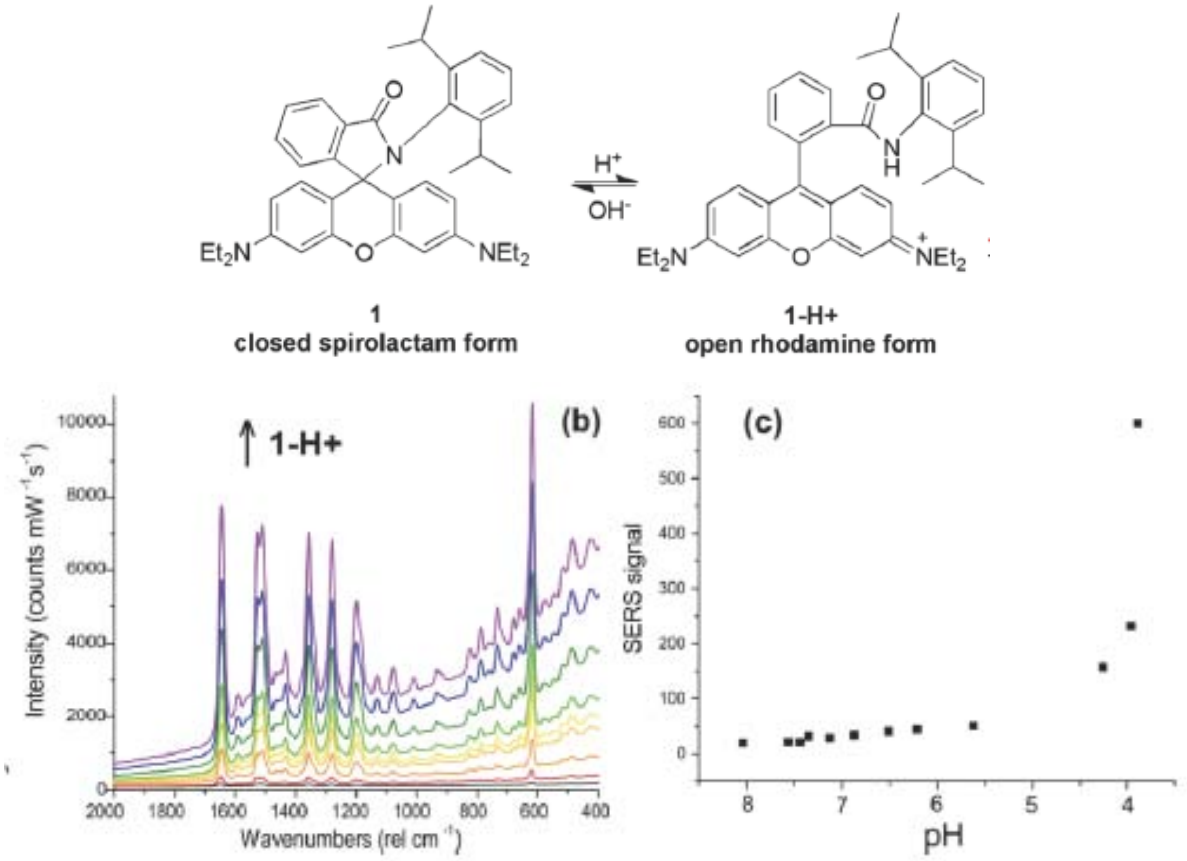
We develop new SERS methods to identify fugitive, organic pigments in art

- Identifying fading pigments in art is a significant analytical challenge
- Surface-enhanced Raman spectroscopy (SERS) = an ultrasensitive chemical fingerprinting tool
- Students: synthesize nanoparticles, SERS microscopy, work in CW labs



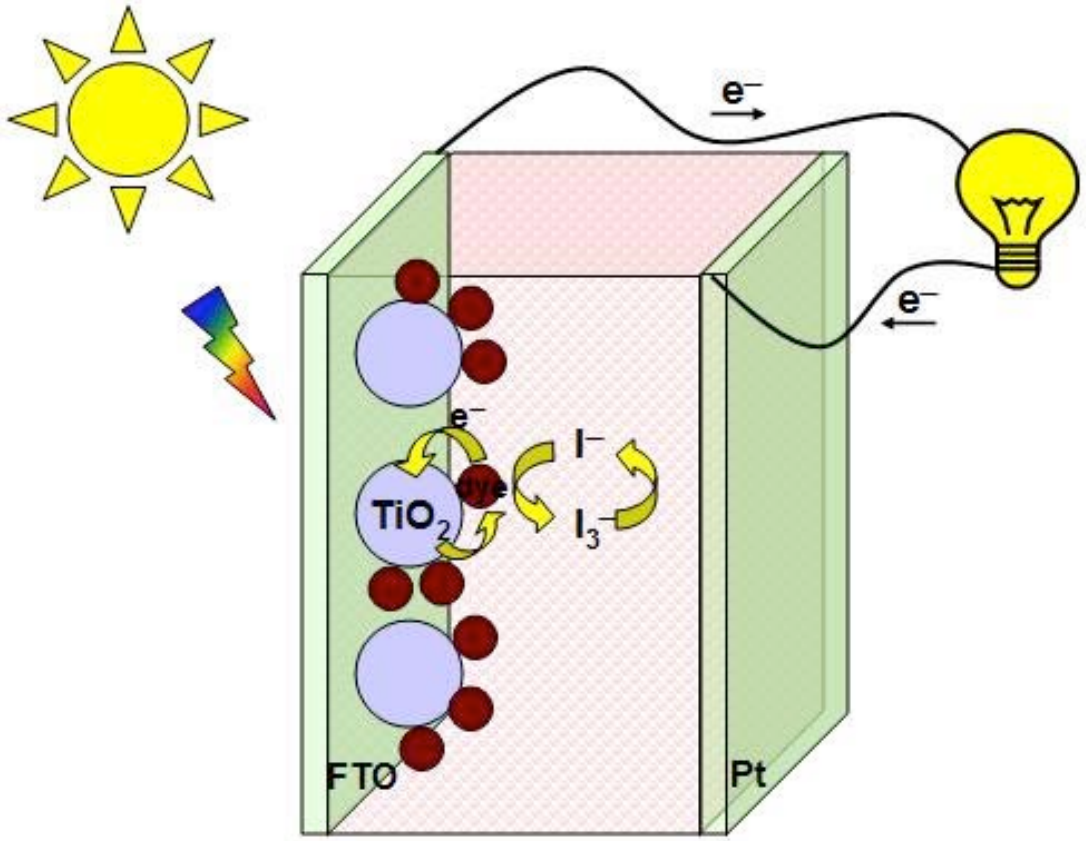
Shelle Butler, Kalie Fikse, Carolyn Farling, Kathleen Lauer, with Paintings Conservator at Colonial Williamsburg

We are now applying these methodologies to develop SERS nanosensors for pH and glucose



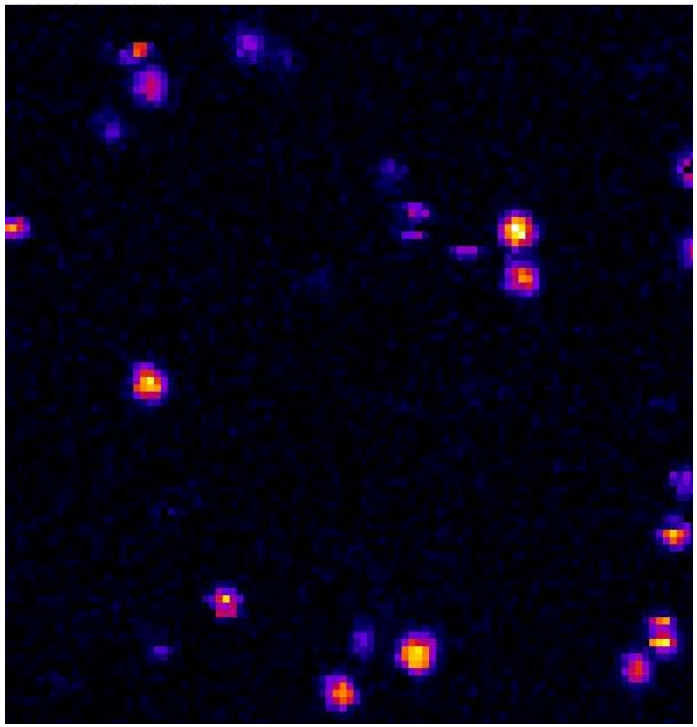
Kate Nelsen, Shelle Butler, and in collaboration with the Harbron group

We probe the aggregation and electron-transfer properties of materials for solar energy conversion



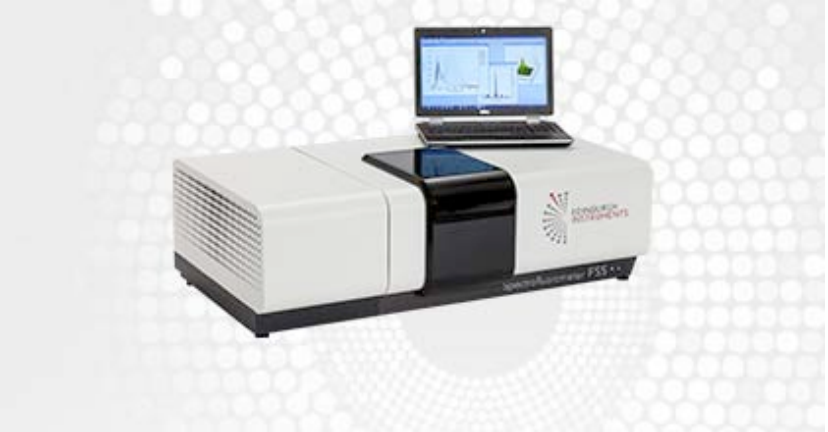
- Solar energy conversion materials must be *low cost* and *efficient*
- Efficiency depends on the absorption of sunlight by dyes & fast electron transfer to TiO_2
- We use spectroscopy to understand the absorption and electron-transfer behavior of organic dyes on TiO_2

We probe the aggregation and electron-transfer properties of materials for solar energy conversion

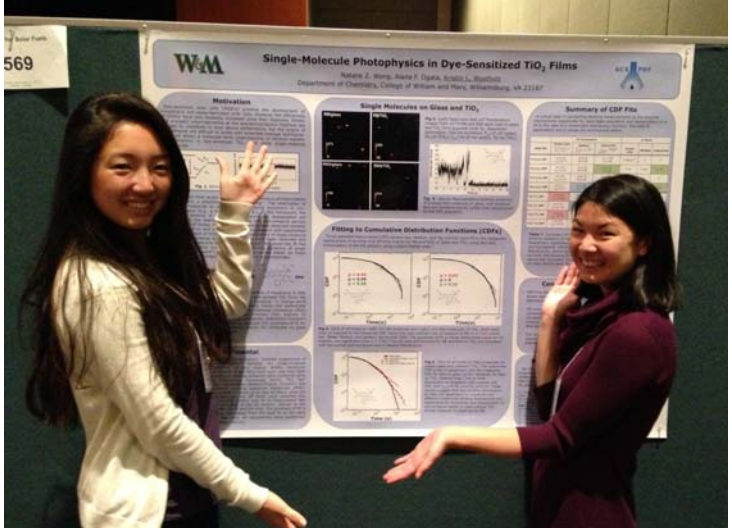


10x10 μm scan of single rhodamine molecules

- Students: sensitizing TiO_2 films, spin coating, laser lab for confocal fluorescence microscopy, time-correlated single photon counting, Matlab computations and analysis



Simran Rohatgi, Polly Lynch, John Li, in collaboration with McNamara group



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Please email me if you're interested!