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**Characterization of the Optical Signal of Nanostructures by Surface Enhanced Raman Spectroscopy** NICKALAS REAMER, MICHAEL REARDON, ARLENE FORD, Slippery Rock University of Pennsylvania — Metal nanostructures exhibit interesting optical properties because of the ability of their free electrons to oscillate and form surface plasmons. These free electrons can be made to oscillate by utilizing a light source at an angle incident to the metal surface. The metal nanostructure will absorb the light incident to its surface causing the electrons to oscillate or resonate. This is called surface plasmon resonance (SPR). In this work, we report on the construction and operation of an optical system that will use transmission and reflection surface enhanced raman spectroscopy to analyze arrays of plasmonic nanohole structures. We will also show how surface enhanced raman spectroscopy signals can be used to analyze nanoparticles of varying sizes.

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