

## **Formation of Gold Nanoparticles and Nanorods Analyzed by SEIRA**

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The goal of this research was to develop the best gold nanostructures for applications in a range of biological, medical, catalytic, environmental, and nanotechnological applications, these were then analyzed using surface-enhanced infrared absorption spectroscopy (SEIRA). Various nanostructures were formed by evaporating gold in vacuum onto CaF<sub>2</sub> substrates at deposition angles ranging from incident to 85°. Nanostructures were characterized with AFM, SEM, and UV/Vis-NIR spectroscopy. A monolayer of *p*-nitrobenzoic acid was deposited onto the gold nanostructures to determine the degree of vibrational enhancement in SEIRA. SEIRA enhancement factors of x20-50 were obtained from metal nanostructures formed by the evaporation of 5-7 nm of gold at incident angle. Gold nanorods aggregated during formation at grazing angles and did not yield larger enhancement factors. Further studies on the gold nanorods are being performed to form nanorods with better enhancement factors, which include different techniques in vapor deposition.