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Observation of UV Surface-Enhanced Raman Spectra using Ga Nanoparticles YANG YANG, Department of Physics, Duke University, JOHN CALLAHAN, Army Aviation and Missile RD&E Center, KEVIN LANTZ, Dept of ECE, Duke Univ, JOHN FOREMAN, Army Aviation and Missile RD&E Center, PAE WU, TONG-HO KING, APRIL BROWN, Dept of ECE. Duke Univ, HENRY EVERITT, Dept of Physics/ECE, Duke Univ; Army Aviation and Missile RD&E Center — Ultraviolet (UV) surface enhanced Raman spectra (SERS) are observed for the first time using gallium nanoparticles (Ga NPs). Ga NP ensembles were synthesized on sapphire substrates at room temperature by molecular beam epitaxy. In situ spectroscopic ellipsometry was used to tune the UV local surface plasmon resonance (LSPR) wavelengths of the Ga NP ensembles during deposition. Three samples were prepared with LSPR wavelengths of 325, 295, and 260nm. UV Raman spectra using a 325nm HeCd laser were collected from fixed thicknesses of cresyl violet, poly(3-hexylthiopene), or MEH-CN-PPV that were spin cast onto these three samples, each of which had a NP-free region. A sample¡¯s enhancement was measured by comparing selected Raman signal intensities from the NP-covered and bare surfaces. Enhancements were found to decrease with increasing detuning between the laser and LSPR wavelengths. Similar behavior was observed from Ga NPs after 3 months of exposure to air, demonstrating the resilience of Ga NPs to oxidation.

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