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**Improving Plasmonic Enhancement of Spectroscopic Signals from Polymer Analytes** REBECCA AGAPOV, ANDREY MALKOVSKIY, CARLOS BARRIOS, University of Akron, Dept. of Polymer Science, Akron, OH 44325, ALEXEI SOKOLOV, Chemical Sciences Division, ORNL and Dept. of Chemistry, University of Tennessee, Knoxville, TN, MARK FOSTER, University of Akron, Dept. of Polymer Science, Akron, OH 44325 — Tip enhanced Raman spectroscopy (TERS), an emerging technique that combines optical microscopy and scanning probe microscopy, provides the sensitivity and selectivity necessary for high-resolution chemical imaging of polymer surfaces. An unprecedented 20 nm lateral resolution for the chemical imaging has been achieved. Unfortunately, the fragile plasmonic structures used to enhance the electric field are prone to mechanical, chemical, and thermal degradation. Developing robust noble metal nanostructures with stable plasmonic resonance is essential to reliable high resolution chemical imaging. Covering the metal layer with protective ultrathin coatings is being investigated to extend the plasmonic activity of the engineered nanostructures. Addition of an ultrathin aluminum oxide ($Al_2O_3$) coating to a silver-coated scanning probe microscopy tip for TERS significantly improves plasmonic structure stability without sacrificing the initial enhancement efficiency. The properties of this coating, the structure of its interface with the plasmonic structure, and its effect on the optical properties of the metal-coated tip are being investigated.

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