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Surface Enhanced Raman Spectroscopy (SERS) of pyridine on Pt[1] QINGZHEN HAO, Physics Department, Penn State University, LASSE JENSEN, Chemistry Department, Penn State University, PETER EKLUND, Physics Department, Penn State University — SERS studies were carried out on vertically oriented Pt cylinders patterned on quartz substrates via e-beam lithography. Optical absorption indicates that Localized Surface Plasmon Resonance (LSPR) of the Pt cylinders in the UV region, around 300nm. Discrete Dipole Approximation (DDA) simulation was performed to confirm the position of the substrate's LSPR and also to map the electric field distribution inside and at the surface of the Pt, which allows us to estimate the Electromagnetic enhancement factor (EF). Experimentally, we demonstrate that the total SERS EF is about 5×10^4 using 514.5nm excitation (far away from the LSPR resonance). Using time-dependent density functional theory we have calculated the off-resonance chemical SERS enhancements of pyridine interacting with small Pt clusters. Our results show that the enhancements are much larger than results obtained for small Ag clusters. We are currently exploring the enhancements for different Pt cluster sizes as well as the importance of charge-transfer excitations. These results will provide detailed insights into the mechanism responsible for the chemical enhancement in SERS.

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Qingzhen Hao
Penn State University

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