Plasmon-Driven Chemistry on Mono and Bimetallic Nanostructure

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In this talk, I will focus on the most recent findings reported by our and other research groups that shed light on the nanoscale properties of mono- and bimetallic nanostructures. This information was revealed by tip-enhanced Raman spectroscopy (TERS), a modern analytical technique that has single-molecule sensitivity and sub-nanometer spatial resolution. TERS findings have shown that plasmonic reactivity and the selectivity of bimetallic nanostructures are governed by the nature of the catalytic metal and the strength of the rectified electric field on their surfaces. TERS has also revealed that the catalytic properties of bimetallic nanostructures directly depend on the interplay between the catalytic and plasmonic metals. We anticipate that these findings will be used to tailor synthetic approaches that are used to fabricate novel nanostructures with desired catalytic properties. The experimental and theoretical results discussed in this talk will facilitate a better understanding of TERS and explain artifacts that could be encountered upon TERS imaging of a large variety of samples. Consequently, plasmon-driven chemistry should be considered as an essential part of near-field microscopy.