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Nanoplasmonics: From Surface-Enhanced Raman Spectroscopy to Nanophotonic Circuits

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The excitation of surface plasmons (SPs), makes metal nanostructures show many novel optical properties. The localized surface plasmon resonances (LSPRs) in metal nanostructures can result in a largely enhanced electromagnetic field, which is the physical basis for surface-enhanced spectroscopy. The huge enhancement greatly improves the sensitivity of Raman spectroscopy, and even single molecules can be detected. In one dimensional nanostructures, SPs can propagate with electromagnetic field tightly confined around the nanostructures, which can be used to realize light transmission beyond the diffraction limit and build nanophotonic circuits. In this presentation, I will talk about the recent progresses made in our group on (1) surface-enhanced spectroscopy and plasmon-induced chemical reactions; (2) controlling SP propagation for nanophotonic circuits.