Colloquium

Confining Light to the Sub-Atomic Scale: Watching Atoms, Electrochemistry, Catalysis, and Sensing

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Host: Rafal Klajn

Our ability to trap light into extreme nanoscale gaps between coinage metals using plasmonics now enables routine vibrational spectroscopies of molecular monolayers, even within active molecular electronics devices. We show how light-induced forces pull single adatoms from metals, to create 'picocavities' which confine light to volumes < 1nm3. Such thousand-fold stronger optical forces depend on nearby molecules as well as temperature and local optical field, and offer a route to single-molecule optical tweezers. Confinement allows new breakthroughs in surface-enhanced Raman scattering (SERS) allowing low-cost robust approaches to sensing of many metal-molecule processes as well as trace analytes in solution or vapour. These have applications in healthcare technologies, environmental protection, agritech, and security, which I will explore.

Monday, June 2, 2025 11:30am - 12:30pm
Raiffeisen Lecture Hall

This invitation is valid as a ticket for the ISTA Shuttle from and to Heiligenstadt Station. Please find a schedule of the ISTA Shuttle on our webpage: https://ista.ac.at/en/campus/how-to-get-here/ The ISTA Shuttle bus is marked ISTA Shuttle (#142) and has the Institute Logo printed on the side.