

Thursday, 8<sup>th</sup> March, 12.00 pm, Seminar Room

Host: Prof. Luis M. Liz-Marzán

## Surface-Enhanced Raman Spectroscopy and Imaging with Molecularly Functionalized Noble Metal Nanoparticles

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Surface-enhanced Raman scattering (SERS) is nowadays widely used in the chemical, life and material sciences.[1] In this talk, our recent results on experimental precision plasmonics for applications in biomedical imaging and chemical energy conversion using molecularly functionalized noble metal colloids in conjunction with SERS will be discussed.[2-4] Firstly, a highly efficient synthesis of SERS labels/nanotags is presented, which generates extremely bright dimer particles in very high yield with precise distance control at the level of single chemical bonds. Correlative microscopic and microspectroscopic experiments at the single-particle level demonstrate their unprecedented optical properties. Secondly, applications of immuno-SERS microscopy (iSERS) for single cell- and tissue-based cancer diagnostics using SERS-labeled antibodies are presented. Thirdly, our most recent efforts on using hot electrons in conjunction with photo-recycling using plasmonic nanostructures [2,4] for performing reduction chemistry involving multiple electron and proton transfer steps will be highlighted.

### References

- [1] S. Schlücker, "Surface-Enhanced Raman Spectroscopy: Concepts and Chemical Applications", *Angew. Chem. Int. Ed.* 53, 4756-4795 (2014).
- [2] W. Xie, S. Schlücker, "Hot electron-induced reduction of small molecules on photo-recycling metal surfaces", *Nature Comm.* 7, 7570 (2015).
- [3] W. Xie, R. Grzeschik, S. Schlücker, "Metal Nanoparticle-Catalyzed Reduction Using Borohydride in Aqueous Media: A Kinetic Analysis of the Surface Reaction by Microfluidic SERS", *Angew. Chem. Int. Ed.* 55, 13729-13733 (2016).
- [4] E. Cortes, W. Xie, J. Cambiasso, A. S. Jermyn, R. Sundararaman, P. Narang, S. Schlücker, S. A. Maier, "Plasmonic hot electron transport drives nano-localized chemistry", *Nature Comm.* 8, 14880 (2017).