

ANNOUNCEMENT

Vortragsankündigung

Mittwoch, 20. November 2024, 11.15 Uhr im SR I

Dr. Olga GUSELNIKOVA

Centre for Electrochemical Surface Technology, Austria
Technical University of Vienna, Austria

“How to use plasmonic materials for chemistry”

The phenomenon of plasmon excitation on the surface of metal nanostructures (NSs) becomes a starting point for the field of plasmon catalysis, which seeks to maximize conversion of light to a wide range of chemical reactions with desired selectivity [1]. While these NSs have been successfully applied toward enhancing catalysis of inorganic reactions such as water splitting, they have also demonstrated exciting performance in the catalysis of organic transformations with potential applications in synthesis of molecules from commodity to pharmaceutical compounds [2]. This talk will give an overview on application of plasmonic NSs to organic reactions, including recent achievements of Dr. Guselnikova [3-5]. It will explain the difference and advantages of plasmonic catalysis compared to classic photocatalysis due to the reduction of required energy. Moreover, there will be an overview of starter package for plasmonic chemistry, such as commonly used NSs, available scope of reaction types, light sources, basic experimental setup, and principles of work. Last, the current perspective and challenges and of plasmonic community will be explained.

References

- [1] Stefancu, A., Halas, N. J., Nordlander, P., & Cortes, E. (2024). Electronic excitations at the plasmon–molecule interface. *Nature Physics*, 1-13.
- [2] Gelle, A., Jin, T., de la Garza, L., Price, G. D., Besteiro, L. V., & Moores, A. (2019). Applications of plasmon-enhanced nanocatalysis to organic transformations. *Chemical reviews*, 120(2), 986-1041.
- [3] Votkina, D., Trelin, A., Semin, V., Lyutakov, O., Svorcik, V., Petunin, P., ... & Postnikov, P. (2024). Size-dependent plasmonic activity of AuNPs for the rational design of catalysts for organic reactions. *Catalysis Science & Technology*.
- [4] Guselnikova, O., Postnikov, P., Kosina, J., Kolska, Z., Trelin, A., Svorcik, V., & Lyutakov, O. (2021). A breath of fresh air for atmospheric CO₂ utilisation: a plasmon-assisted preparation of cyclic carbonate at ambient conditions. *Journal of Materials Chemistry A*, 9(13), 8462-8469.
- [5] Kushnarenko, A., Zabelina, A., Guselnikova, O., Miliutina, E., Vokatá, B., Zabelin, D., Svorcik V., Lyutakov, O. (2024). Merging gold plasmonic nanoparticles and l-proline inside a MOF for plasmon-induced visible light chiral organocatalysis at low temperature. *Nanoscale*, 16(10), 5313-5322.