



TECHNISCHE UNIVERSITÄT
IN DER KULTURHAUPTSTADT EUROPAS
CHEMNITZ

Institut für Physik Physikalisches Kolloquium



Donnerstag, 17.10.2024, 15:30 Uhr
Ort: Reichenhainer Str. 90;
Zentrales Hörsaal- und Seminargebäude, Raum C10.013

Dr. Naresh Kumar

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Nanoscale Investigation of Catalytic Processes using Tip-Enhanced Raman Spectroscopy

During the last two decades, Tip-Enhanced Raman Spectroscopy (TERS) has emerged as a powerful tool for studying surface chemistry with nanoscale spatial resolution [1]. This seminar will highlight the fundamental principles, significant contributions, and potential of TERS in the nanoscale investigation of surface catalytic processes. The seminar will be organized into three parts: In the first part, I will present the fundamental principles of TERS. In the second part, I will focus on the application of TERS to study catalytic reactions. I will start by highlighting TERS's ability to map catalytic activity at the nanoscale, providing insights into the spatial distribution of photocatalytic reaction hotspots on a nanostructured Ag surface [2].

I will then discuss photocatalytic processes in the liquid phase using TERS [3] followed by investigation of reactive arrangements in on-surface photocatalytic coupling reactions using TERS [4]. Next, I will discuss how TERS can elucidate the mechanistic understanding of oxygen activation on bulk Au(111) surfaces [5]. In the third part, I will discuss our latest work on nanoscale visualization of plasmon-enhanced hydrogen activation on Pt(111) surface using in situ TERS measurements. Overall, these studies will demonstrate the unique capabilities of hyperspectral TERS imaging for advancing our understanding of surface catalytic processes at the nanoscale.

References

- Z.-F. Cai, N. Kumar, R. Zenobi, *CCS Chem.*, 2023, 5, 55-71
- N. Kumar, B. Stephanidis, R. Zenobi, A. J. Wain, D. Roy, *Nanoscale*, 2015, 7, 7133-7137
- N. Kumar, C. S. Wondergem, A. J. Wain, B. M. Weckhuysen, *J. Phys. Chem. Lett.*, 2019, 10, 1669-1675
- Z.-F. Cai et al., *J. Am. Chem. Soc.*, 2022, 144, 538-546
- Z.-F. Cai, Z.-X. Tang, Y. Zhang, N. Kumar, *Angew. Chem. Int. Ed.*, 2024, 63, e202318682

Alle Zuhörer sind ab 15:15 Uhr zum Kaffee vor dem Hörsaal eingeladen.

Informationen zum Vortrag erteilt:
Prof. Dr. Dr. h.c. Dietrich R.T. Zahn, Tel.: 531 33036



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