TECHNISCHE UNIVERSITÄT
IN DER KULTURHAUPTSTADT EUROPAS
CHEMNITZ

Institut für Physik
Physikalisches Kolloquium

Donnerstag, 25.04.2024, 15:30 Uhr

Ort: Reichenhainer Str. 90;
Zentrales Hörsaal- und Seminargebäude, Raum C10.013

Prof. Dr. Elizabeth von Hauff

1 Fraunhofer Institute for Organic Electronics, Electronbeam and Plasma Technology (FEP)
2 Faculty for Electrical and Computer Engineering, TU Dresden

In-situ tools for studying dynamics and electronic structure at functional interfaces in energy conversion devices

Functional interfaces are at the heart of solid state and electrochemical energy conversion technologies, such as solar cells and batteries. Impedance spectroscopy is well-suited for studying in-situ interfacial dynamics and electronic structure in these devices, and can be applied as a diagnostic tool to identify performance losses under different operational conditions [1,2]. In this talk I will give a brief introduction to impedance spectroscopy, including the mathematical background and conventions for data representation, as well as how to choose the operational point for measurement, check data reliability, and finally how to parameterise the spectra [1,2].
In the case of solar energy conversion, combining electrical techniques, such as impedance spectroscopy, with steady-state and time-resolved optical spectroscopy can offer complementary insights into dynamics related to fundamental processes and loss mechanisms [3, 4]. As an outlook, I will present arguments for considering non-equilibrium dynamics as fundamental signatures in energy conversion, and the role of spectroscopic tools for identifying these dynamics [5].

[1] E. von Hauff, Impedance Spectroscopy for Emerging Photovoltaics, *J. Phys. Chem C*, 123 (2019) 11329.
[2] E. von Hauff and D. Klotz, Impedance Spectroscopy for Perovskite Solar Cells: Characterization, Analysis, and Diagnosis, *J. Mater. Chem. C*, 10 (2022) 742-761.
[3] E. M. Hutter, T. Kirchartz, B. Ehrler, D. Cahen, E. von Hauff, Pitfalls and prospects of optical spectroscopy to characterize perovskite-transport layer interfaces, *Appl. Phys. Lett. Perspective*, 116 (2020) 100501.
[4] S. Maity, C. Ramanan, F. Ariese, R. C. I. MacKenzie, E. von Hauff, In Situ Visualization and Quantification of Electrical Self-Heating in Conjugated Polymer Diodes Using Raman Spectroscopy, Adv. Elect. Mater., 8 (2022) 2101208.
[5] R. Alicki, D. Gelbwaser-Klimovsky, A. Jenkins, E. von Hauff, Dynamical theory for the battery's electromotive force, Phys. Chem. Chem. Phys. 23 (2021) 9428-9439

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

Informationen zum Vortrag erteilt:
Prof. Dr. Carsten Deibel, Tel. 0371 531 34878

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Biography

Elizabeth von Hauff studied Physics at the University of Alberta in Edmonton, Canada. Her PhD and Habilitation work was performed at the University of Oldenburg, Germany in experimental physics.

In 2011 Elizabeth accepted a joint appointment between the Institute of Physics, University of Freiburg and the Fraunhofer Institute for Solar Energy Systems (ISE).

From 2013 – 2021 Elizabeth was an Associate Professor in Physics at the VU Amsterdam. In 2020 she was appointed as a special Chair in Chemistry at the University of Amsterdam.

In 2021, she accepted an appointment as director of the Fraunhofer FEP and Professor in Electrical Engineering at the TU Dresden. Her research interests lie in fundamental questions in physics and chemistry within the context of real applications.