cfaed Colloquium Keynote

DATE: 27 September 2019
TIME: TBC - Afternoon
LOCATION: TU Dresden, Barkhausen-Bau (BAR), Heinz-Schönfeld-Hörsaal BAR I90, Georg-Schumann-Str. 13, 01187 Dresden

SPEAKER: **Prof. Dr. Ulrich S. Schubert**
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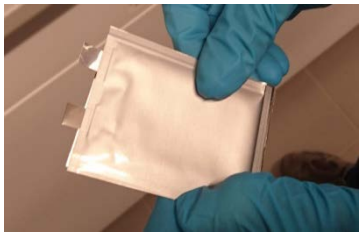
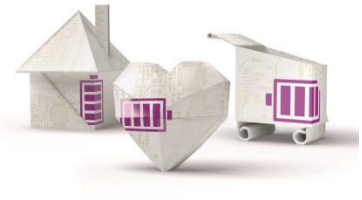
TITLE: ***"Printable (semi)flexible thin-film polymer batteries: New possibilities for applications in organic electronics, IoT, smart health sensors, solar batteries, smart packaging and others"***

Abstract:
The fourth industrial revolution and the growing Internet of Things (IoT) pave the way for gadgets such as active radio-frequency identification (RFID) tags, mobile sensor systems, smart packaging and clothing, as well as ubiquitous integrated circuits. The large variety of the upcoming electronic devices leads to an extensive need for tailor-made energy-storage solutions, which have to offer specific characteristics like energy and power values, depending on the required application, and demand for suiting battery technologies. This upcoming field of electronics requires for not only lightweight and flexible, but also cheap and safe mobile energy supply. In this regard, batteries based on organic active materials represents an aspiring and promising element in this field of application. [1-2]
The versatility of organic molecules and functionalization techniques allows the tailoring of important characteristics, like the cell potential and the rate performance. Charge/discharge mechanisms that include intercalation/insertion processes, like in Li-ion batteries, constitute a bottleneck for the rate performance. In contrast, the redox reactions of suitable organic moieties, like stable radicals or quinone derivatives, reveal fast kinetics and high rate performances, leading to an increased power density.
Furthermore, organic compounds, in particular polymers, feature several explicit advantages. They are less toxic and mechanically flexible and enable the application of straightforward and cheap manufacturing techniques, such as printing or roll-to-roll processing. In addition, they can be potentially prepared from renewable resources and easily disposed by incineration without the formation of toxic byproducts, such as critical metal oxides.

As a consequence, batteries based on organic materials provide the opportunity for more sustainable, versatile and low-cost energy storage devices and enable innovations in new fields, such as smart health sensors.





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[1] S. Muench, A. Wild, C. Friebe, B. Häupler, T. Janoschka, U. S. Schubert, Chem. Rev. 2016, 116, 9438-9484.
[2] P. Poizot, F. Dolhem, J. Gaubicher, Current Opinion in Electrochemistry 2018, 9, 70-80.
[3] https://www.taettooz.com/product/taettooz/en/
[4] https://www.siio.de/temptraq-fieber-smart-per-pflaster-messen/

Bio:

Scientific degrees

Venia legendi in chemistry, TU Munich (1999)
Habilitation in chemistry, TU Munich (1996-1999; mentor Prof. O. Nuyken)
PhD in chemistry, University of Bayreuth (1995; supervisor Prof. C. D. Eisenbach)
PhD studies, University of Bayreuth and University of South Florida, USA (1993-1995; supervisors Prof. G. Newkome and Prof. C.-D. Eisenbach)

Professional career

2007-to date	Professor (W3), FSU Jena
2005-2014	Scientific Chairman TA HTE, Dutch Polymer Institute (DPI), NL
2000-2007	Full-Professor, Laboratory for Macromolecular Chemistry and Nano-science, Eindhoven University of Technology, The Netherlands
2000	Privatdozent (Heisenberg-Fellowship), TU Munich
1999-2000	Associate professor, Center for NanoScience, LMU Munich
1995-1996	Postdoc, Uni Louis Pasteur Strasbourg, France (Prof. J.-M. Lehn, Nobel laureate Chemistry 1987)

Prices and honors (selected):

University Teacher of the Year, German University Association (DHV) and DIE ZEIT (2019)
Federal Cross of Merit (“Bundesverdienstkreuz am Bande”) (2018)
Elected fellow of the National Academy of Inventors (NAI, USA, 2018)
Thüringer Forschungspreis (2017)
ISI “Highly cited researcher” in Chemistry (2016)
Thüringer Innovationspreis (SmartDyeLivery, 2015)
Elected member of the German National Academy of Science and Engineering (acatech) (2015)
IQ Innovationspreis Mitteldeutschland (JenaBatteries, 2015)
Fellow of the Royal Society of Chemistry (FRSC), RSC, UK (2014)
ISI “Highly cited researcher” in Materials Science (since 2014)
ACS Division of Polymer Chemistry, Polymer Division Fellow, USA (2013)
International Biannual BPG Award, Belgian Polymer Group (2010)
Jan Pieter Lemstra Innovation Award, Dutch Polymer Institute (2009)
VICI award of the Netherland Organization for Scientific Research (1.25 M€, 2004)