

# UniCat Seminar

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- Lecturer: **Dr. Ümit Akbey**, NMR Supported Structural Biology, Leibniz-Institut für Molekulare Pharmakologie im Forschungsverbund Berlin e.V. (FMP), Campus Berlin-Buch, Germany
- Title: **Hyperpolarized Solid-State NMR Studies on Functional & Biological Materials: A new breakthrough towards ultra-high sensitivity**
- Abstract: Solid-state nuclear magnetic resonance (ssNMR) spectroscopy has been proven to be a robust and powerful technique for determining structure and dynamics of supramolecular functional materials and biological systems at molecular level. For example, the characterization of supramolecular architectures, such as proton conducting membrane polymers and plastic electronic materials, is of most importance to understand their properties. Solid-state NMR methods can unravel such structure-property relations with the help of fast magic-angle spinning and advanced NMR pulse sequences. In particular,  $^1\text{H}$  ssNMR spectroscopy is suitable for studying hydrogen-bonding networks, local proton mobility, molecular packing arrangements, surface functionality, and local dynamics without the requirement of isotopic-labeling.
- Despite its indispensable use in material science and structural biology, ssNMR has the disadvantage of inherent low sensitivity. This is especially an issue when working with “difficult to obtain proteins” such as membrane proteins, or surface functionalities. NMR signals from such systems can not be obtained in reasonable experimental times. As a result, methods for sensitivity enhancement are highly required to increase the scope of ssNMR. Remarkable success has been achieved recently by using a technique called dynamic nuclear polarization (DNP). This method exploits the transfer of large initial Boltzmann polarization of electron spin states to those of neighboring nuclei. Theoretical nuclear signal enhancements of  $(\gamma_e/\gamma_n) \sim 660$  can be obtained for  $^1\text{H}$  nuclei, which could result up to  $\sim 10^{5-6}$  reduction in experimental time. The recent progress will be summarized in the DNP enhanced ssNMR spectroscopy, as well as its utilization to characterize surfaces of important functional materials.
- Date: **Wednesday, June 19<sup>th</sup>, 2013 at 5:15 pm**
- Location: **TU Berlin, Department of Chemistry  
Straße des 17. Juni 115, 10623 Berlin  
Building C, Lecture Hall C 264**
- Organisation **Dr. Jan Dirk Epping (TUB),  
Dr. Sebastian Kemper (TUB)**

Coffee and tea will be served thirty minutes prior to the lecture start.  
**Guests are cordially invited to attend!**

Prof. Dr. Matthias Driess, Chair of the Cluster of Excellence UniCat