



Polymers under Multiple Constraints

Polymer- & Soft-Matter-Seminar

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"Structure and Dynamics of Polymers: Influence of Confinement, Architecture and Supramolecular Associations"

Over the last decades, synthetic polymer materials have become an important part of our everyday lives. At breakfast, we have bottles of orange juice made of polyethylene. Our car bumper is made of high impact polypropylene, the interior is largely composed of polyurethane, the tires are elastomers and parts of the bodywork are polymer mixtures. In this context, a fundamental understanding of the structure and dynamics of polymers at different time and length scales is crucial for the design of polymers with improved physical and mechanical properties for nowadays applications. There are different experimental techniques providing access to the properties of polymers from a microscopic to a macroscopic scale.

In this talk, a number of key results for different polymers investigated by means of dielectric spectroscopy and neutron scattering will be highlighted. In the first part, the changes on the molecular dynamics of poly(L-lactic acid) (PLLA) under soft confinement will be discussed [1,2]. In the second part of the talk the importance of macromolecular topology on the polymer dynamics, like in the case of poly(ethylene glycol) (PEG) ring polymers will be demonstrated [3]. Finally, the supramolecular association influence on well-defined telechelically modified PEG and polypropylene glycol (PPG) structure and dynamics will be presented. Based on the static results [4], very recent neutron spin echo experiments directly revealed hydrogen bond lifetime, which is one of the key parameters determining macroscopic properties of supramolecular polymer melts [5].

**Tuesday,
30th January
2018**

at: 5.15pm

**VDP4 1.27,
Von-Danckel-
mann-Platz 4,
06120 Halle**

[1] A. R. Brás, M. T. Viciosa, Y. Wang, M. Dionísio, J. F. Mano, *Macromolecules* 39 (2006) 6513-6520.

[2] A. R. Brás, P. Malik, M. Dionísio, J. F. Mano, *Macromolecules* 41 (2008) 6419-6430.

[3] A. R. Brás, S. Gooßen, M. Krutyeva, A. Radulescu, B. Farago, J. Allgaier, W. Pyckhout-Hintzen, A. Wischnewski, D. Richter, *Soft Matter*, 10, (2014) 20, 3649-3655.

[4] A. R. Brás, C. H. Hövelmann, W. Antonius, J. Teixeira, A. Radulescu, J. Allgaier, W. Pyckhout-Hintzen, A. Wischnewski, D. Richter, *Macromolecules*, 2013, 46, 9446. M. Krutyeva, A. R. Brás, W. Antonius, C. H. Hövelmann, A. S. Poulos, J. Allgaier, A. Radulescu, P. Lindner, W. Pyckhout-Hintzen, A. Wischnewski, D. Richter, *Macromolecules*, 2015, 48 (24), 8933.

[5] M. Monkenbusch, M. Krutyeva, W. Pyckhout-Hintzen, W. Antonius, C. H. Hövelmann, J. Allgaier, A. Brás, B. Farago, *Physical Review Letters*, 117 (2016), 14, 147802.

