

MAR13-2012-004016

Abstract for an Invited Paper  
for the MAR13 Meeting of  
the American Physical Society

### **Polymer Dynamics in Nanocomposites and under Confinement**

DIETER RICHTER, Juelich Centre for Neutron Science, Forschungszentrum Juelich, 52425 Juelich Germany

In this talk I will present neutron spin echo investigations on polymers interacting attractively with nanoparticles or confining surfaces. Polyethylene-oxide (PEO) was filled with neat SiO<sub>2</sub> nanoparticles up to 15 vol%. Investigating a short chain matrix we realised that a fraction of chains is adsorbed at the nanoparticle surface suppressing completely its translational diffusion. Nevertheless these adsorbed chains undergo an unchanged segmental dynamics seemingly forming a micelle like corona of chains connected with their OH-end groups. Changing to methylene terminated chains the picture changes drastically now showing a tightly adsorbed layer that however is not glassy as often assumed but undergoes pico second local dynamics. These results are corroborated and extended in studying the dynamics of Polydimethylsiloxane (PDMS) confined in nanoporous Alumina. There a partly anchored chain fraction is found that undergoes restricted Rouse motions with segmental mobilities as in the bulk phase. The size of this layer exceeds significantly the length scale of the directly adsorbed polymer, presenting a first direct microscopic evidence for the hypothetical interphase.