Polymers under Multiple Constraints

Special Event

Thursday,

7th August 2014

at: **3.00 pm**

Seminar-Room of Fraunhofer IWM @ Walter-Hülse-Str.1, 06120 Halle

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Control of Block Copolymer Morphology and Properties Through Molecular Architecture Variation

Currently, there is tremendous interest in using the self-assembling properties of block copolymers as a route to nanostructures of controlled size, shape and long range order. We have been exploring the influence of branched block copolymer architecture on the morphologies, including: microphase separated domain shape, defect formation and long range order. We have shown that molecular architecture influences the ability to form long range order as indicated by the size of growing grains of coherent structural orientation. It was found that the grain growth kinetics for the A_nB_n stars with n = 2, 4, and 16 were similar in supercritical CO_2 and in thermal annealing. However, grain growth of the diblock (A_nB_n with n = 1) was dramatically enhanced in supercritical CO_2 relative to the same material under thermal annealing. Long range order was found to be suppressed in graft copolymers with increasing number of branched points per molecule. However, these branched architectures were discovered to have exceptional mechanical properties including good strength coupled with over 2000% elongation at break and very low permanent set after deformation. We are currently exploring was to scale up production of these novel *Superelastomers* for a range of applications