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Diffusion of Block-Copolymer Micelles Close to the Water-Oil Interface — ●ANTONIO STOCO¹, STERGIOS PISPAS² und REINHARD SIGEL¹ — ¹Max-Planck-Institut of Colloids and Interfaces, D-14476 Golm — ²National Hellenic Research Foundation, Theoretical and Physical Chemistry Institute, 11635 Athens, Greece

The interaction of block copolymer micelles in water with a brush composed of the same block copolymer at the water-oil interface is investigated. For a concentration above the critical micelle concentration, the block copolymers adsorbed to interfaces coexists with block copolymer micelles in solution. Close to the interface, a modification of the micelle diffusion compared to the bulk behavior is expected because of changed friction and possible exchange processes. We built up an apparatus for light scattering with evanescent wave illumination of a liquid-liquid interface. In this special geometry, only a thin layer at the interface is illuminated, allowing for dynamic light scattering measurements close to the interface. In addition, ellipsometry measurements within the same apparatus give access to the interface profile. First results on polyisoprene-block-polyethyleneoxide polymers at to the water-dodecane interface are discussed.

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Tailoring the structure of hybrid organic-inorganic tetra and polyfunctional alco-oxo-titanium clusters in polystyrene — ●SONDES TRABELSI^{1,2}, GIULIA FORNASIERI^{3,4}, LAURENCE ROZES³, ANDREAS JANKE¹, AXEL MENSCH⁵, CLÉMENT SANCHEZ³, and MANFRED STAMM¹ — ¹Leibniz Institut für Polymerforschung Dresden e.V., Hohe Strasse 6, 01069 Dresden, Germany — ²Forschungszentrum Karlsruhe GmbH, Institute für Synchrotronstrahlung, ANKA, Hermann-von-Helmholtz-Platz 1, 76344 Karlsruhe, Germany — ³Laboratoire de Chimie de la Matière Condensée, UMR CNRS 7574, — ⁴Laboratoire de Chimie Inorganique, Institut de Chimie Moléculaire et des Matériaux d'Orsay (ICMMO), Bat 420 Université Paris-Sud 11, 91405 Orsay Cedex, France — ⁵Technische Universität, Dresden, Institut für Werkstoffwissenschaft, Helmholtzstraße 7, 01062 Dresden, Germany

Two types of Ti16O16(OEt)32-x(OPhCH=CH2)x cluster have been synthesized with different numbers of styrenic functional groups (i.e. tetra (x = 4) and poly (x = 16)) introduced on the surface of the cluster s core. Investigations combining small angle X-ray scattering (SAXS), transmission electro microscopy (TEM) and energy-filtering transmission electron microscopy (EFTEM) lead to a better understanding about the influence of the functionality s number on the structure of the hybrid nanomaterials. Compared to the tetra functional clusters the poly functional clusters were good dispersed in the hybrid even at very high content between 5 wt% and 10 wt%. Independently of the number of functionalities, three structural levels. The size of the aggregates has been reduced significantly by increasing the number of styrenic reactive groups.

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Analytical centrifugation to describe rheological behaviours of concentrated suspensions — ●TORSTEN DETLOFF, TITUS SOBISCH, and DIETMAR LERCHE — L.U.M. GmbH, Rudower Chaussee 29, 12489 Berlin, Germany

The flow behaviour of concentrated suspensions is mostly characterized by viscometric approaches. The interpretation of the results, especially at low shear rates, is often difficult due to sedimentation and particle migration within the viscometric gap. But studying separation processes can give information about the viscosity behaviour of such suspensions, because of the close connection between sedimentation kinetics and rheology. In this paper analytical centrifugation were used to determine the viscosity functions of spherical rigid particles in the nanometer range depending on volume concentrations between 5 and 47%. The measurement device - a multisample analytical centrifuge - LUMiSizer® (L.U.M. GmbH, Berlin Germany) employs the STEPTM-Technology (Space and Time resolved Extinction Profiles), which allows to measure the intensity of transmitted light as function of time and position over the entire sample length simultaneously. From this data the values of the flux density function at different initial volume concentrations were determined and a viscosity law as functions of volume concentration obtained by fitting. The approach was applied to spherical biological cells and silica particles.

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Dendrimer-Based Nanoassemblies: Insights from Small Angle Scattering Experiments — ●RALF KLEPPINGER — DSM Research

Highly branched macromolecules have found widespread applications in the growing field of nanomaterials. From an application point of view, hyperbranched systems (with less defined architecture) appear to be rather attractive candidates for bulk applications that allow tailoring of rheological properties. Dendrimer systems with their highly defined three-dimensional architectures on the other hand appear to be promising candidates in the field of biomedical materials where they have been proposed as new type of drug delivery systems. In any case, the investigation of such systems and in particular their complexes, represents a significant challenge. In this contribution we summarize results from small angle X-ray and -neutron scattering investigations that were performed on dendrimers and dendrimer-based complexes.

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Rigid Amorphous Fraction of Polymer Nanocomposites and Semicrystalline Polymers — ●ALBERT SARGSYAN¹, SELVIN THOMAS², ANDREAS WURM¹, SABU THOMAS², and CHRISTOPH SCHICK¹ — ¹aUniversity Rostock, Dept. Physics, Universitätsplatz 3, 18051 Rostock, Germany — ²Mahatma Gandhi University, School of Chemical Sciences, Kottayam, India

Very often semicrystalline polymers cause significantly smaller relaxation strength at glass transition than expected from the non-crystalline fraction. This observation could be explained by the introduction of a rigid amorphous fraction (RAF) which does not contribute to the heat of fusion or X-ray crystallinity nor to the relaxation strength at glass transition. The RAF is non-crystalline and in a glassy state above the common glass transition temperature. From heat capacity the temperature and time dependence of the RAF can be obtained. For PC, PHB and sPP it is possible to study the creation and disappearance of the RAF in situ during isothermal crystallization and on stepwise melting. A RAF can be detected for polymer nano-composites too. The approximate amount of the RAF was calculated taking into account the difference in Δc_p step between pure and filled polystyrene nano-composites. The solvents added as plasticizers haven't entered into the RAF even above the glass transition temperature (T_g). This gives the opportunity to create highly solvent resistant polymer nano-composites based on common polymers like polystyrene.

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Thermoplastic SBS nanocomposites based on brush coated silica microgels — ●LESZEK JAKUCZEK^{1,2} and JOCHEN GUTMANN^{2,3} — ¹Department of Polymer Engineering and Technology, Wroclaw University of Technology, Wybrzeze Wyspianskiego 27, 50-386 Wroclaw, Poland — ²Max Planck Institute for Polymer Research, Ackermannweg 11, D-55128 Mainz — ³Institute for Physical Chemistry, Johannes Gutenberg University, Welderweg 11, D-55099 Mainz

Physical modification of block copolymers enables the preparation of new types of materials exhibiting significantly improved mechanical and rheological properties. Especially well-defined nanofillers, with properties tailored at molecular level, are believed to be effective reinforcing agents, capable of meeting the expectations in new areas of application. One route leading to such nanocomposites is synthesis and incorporation of surface modified nanoparticles, like e.g. ultrafine polymer-grafted silica beads synthesized in emulsion. After surface modification via a grafting from ATRP synthesis, the resulting core-shell composites can be used in selective reinforcement of a chosen phase. Linear styrene-b-butadiene-b-styrene thermoplastic elastomer was modified with polystyrene-grafted organosilicon micro-gel particles. The state of filler dispersion and degree of grafting, morphology of the resulting nanocomposites, as well as their mechanical, rheological and thermal properties are examined using SEM, SAXS, GPC, DSC and dynamic thermomechanical analysis in order to provide information on interactions between filler and the modified matrix.

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Modification of the thermal properties of epoxies by anorganic nanoparticles — ●JÖRG BALLER^{1,2}, ROLAND SANCTUARY^{1,2}, MARTINE PHILIPP^{1,2}, RAVI BACTAVATCHALOU¹, and J. K. KRÜGER¹ — ¹Laboratoire Européen de Recherche Universitaire : Saarland-Lorraine-Luxembourg — ²Université du Luxembourg, Laboratoire de Physique des Matériaux, 162 a, avenue de la Faiencerie, L-1511 Luxembourg

Curing and polymerisation behaviour of epoxies filled with nanoparticles were investigated using Modulated Differential Scanning Calorimetry. Depending of the type of incorporated nanoparticles, important properties like relaxation behaviour and glass transition are considerably