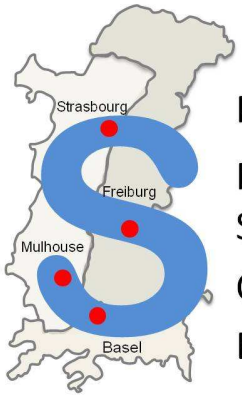

PHYSICS
MATERIALS SCIENCE
CHEMISTRY
BIOLOGY

Seminar

"IRTG: Soft Matter Science "

Tailoring surfaces and interfaces in soft materials

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Wednesday, Oct. 20, 2010

14H00

"Hörsaal Makromolekulare Chemie", Stefan-Meier-Str. 31

UNI FREIBURG

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In my presentation, I will outline three research areas aiming at tailoring functionality of polymer-based soft materials with particular emphasis on surfaces and interfaces. First, I will present simple methodologies leading to the formation of complex surface assemblies of surface-tethered polymers with continuous variation of physico-chemical properties (e.g., wettability, molecular weight, grafting density, chemical composition). I will then demonstrate how these grafted "gradient" surfaces can be employed to control the spatial distribution of nanosized adsorbates, i.e., nanoparticles and proteins, and administer proliferation of living cells on the surfaces. In the second part, I will illustrate how flexible SENs can be employed to tailor the surface grafting density of oligomers or polymers, create responsive ("smart") surfaces with tailored response rate and characteristics, generate topographically corrugated surfaces comprising multidimensional cascades of wrinkles, or fabricate flexible color-changing sheets based on photochromic compounds. Application of functionalized SENs in material assembly, marine antifouling, and removal of organic phases (including crude oils) from water will also be discussed. Finally (if time permits), I will conclude with a brief survey of heteropolymers with adjustable monomer sequences (HAMS), which represent a new type of functional random copolymers that could play an important role in emerging areas pertaining to interfacial science and polymer assembly. HAMS are synthesized in a laboratory by "chemically coloring" the segments of a collapsed homopolymer (say, A) with a functionalizing agent (say, B) and then unraveling the resultant polymer to yield a random sequence of A and B segments, which "remembers" its original collapsed conformation and hence prefers some conformations over others. I will provide examples of a few case studies that unravel the tailorable interfacial and bulk self-assembly character of HAMS made of poly(styrene-*co*-4-bromostyrene) and its derivatives. Results of computer simulation studies will also be discussed that provide molecular insight into forming HAMS.

Jan Genzer received his "Diploma-engineer" degree (Dipl.-Ing.) in Chemical & Materials Engineering from the Institute of Chemical Technology in Prague in 1989. In 1991 he moved to the U.S. to pursue graduate studies at the University of Pennsylvania under the direction of Professor Russ Composto, receiving the Ph.D. degree in Materials Science & Engineering in 1996. After 2 post-doctoral stints with Professor Ed Kramer first at Cornell University (1996- 1997) and later at University of California at Santa Barbara (1997-1998), Genzer joined the faculty of chemical engineering at the NC State University as an Assistant Professor in fall 1998. He is currently the Celanese Professor of Chemical & Biomolecular Engineering at NC State University. His honors include: Camille Dreyfus Teacher-Scholar Award, NSF CAREER award, John H. Dillon Award of the American Physical Society, NSF Award for Special Creativity, NC State's Outstanding Teacher Award, NC State Alumni Outstanding Research Award, NC ACS Outstanding Lecturer Award, and others. He's a Fellow of the American Physical Society. Genzer published >140 peer-reviewed journal articles and delivered >170 invited lectures. His group at NC State University is actively involved in research related to the behavior of polymers at interfaces and in confined geometries, with particular emphasis on self-assembly and forced assembly and combinatorial methods.