Seminar

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Plasma Polymers For Designing Reversible Mechanoresponsive Bioactive Surfaces

Plasma assisted polymer synthesis draw a considerable attention not only because of its versatility and flexibility but also because of its economic and ecological advantages. When an electric field is applied across a vapour or gas filled chamber of a suitably "polymerisable" compound (termed "monomer"), it ionizes a fraction of the molecules and generates electrons, ions, radicals, photons and molecules (on both ground and exited state) within the gas plasma. Polymer thin film growth then occurs within this environment. Traditionally, plasma polymers lead to high cross-linked macromolecular structures which differ from the precursor structure used. In order to counterbalance this phenomenon, we focus our researches on pulsed plasma polymerization. This entails modulating the electrical discharge on the ms-µs time scales and comprises two distinct reaction regimes corresponding to the on- and off- periods. It is expected that plasma polymerization could be proceeded during the 'on' period and also during the 'off' period. But a conventional polymerization such as radical addition reaction takes place during the 'off' period discharge. This gives rise to extremely high levels of structural retention and incorporation of specific functional groups at the surface. By programming the on/off periods, it is possible to control the desired density of the functional groups at the surface. This variant is used to control variations in the nanometric scale of chemical compositions and physical properties of the material surfaces.

The design of responsive materials and in particular mechanosensitive materials is now thoroughly investigated and it emerges as an extremely hot topic. We present here two examples of mechanoresponsive surfaces designed *i)* by using plasma polymers as platforms to attach materials sensitive to the mechanical stimuli or *ii)* by exploiting intrinsic properties of plasma polymers to change their performances under stretching. Such surfaces would not only be of fundamental interest but could also present numerous potentialities from a technological point of view.

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Hörsaal Makromolekulare Chemie, Stefan-Meier-Str. 31

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