

Tailor-Made Polymer Surfaces for Microsystems Engineering - From Computer Hard Disks to DNA-chips

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The unprecedented triumph of silicon technology in modern high tech applications was and is strongly coupled to the development of so-called photoresists. Recently, however, polymers gain more and more importance in microsystems engineering as structural and functional materials. Quite often rather simple microreplication techniques such as hot embossing or microinjection molding can be implemented, which allow for simple mass production of even rather complicated structures.

For such systems it is obvious that with increasing miniaturization the influence of the materials surfaces is becoming more and more important as surfaces control all the interactions of the material with its environment. Examples are adhesion and wetting processes and the adsorption of molecules from the surrounding medium. Accordingly it is important to develop a set of chemical tools which allow the attachment of polymer molecules to surfaces of different chemical compositions. In the presentation several new strategies will be presented which allow to generate micropatterned polymer layers with tailor-made properties with high spatial resolution on a variety of different substrates [1-5].

The focus of the presentation will be exclusively placed onto systems in which the polymer molecules are covalently attached to the surfaces of the substrates. Applications of such layers include work on such different questions as to how thin polymer coatings can be used to increase the sensitivity of DNA chips or as to how the wetting properties of surfaces can be effectively controlled from superhydrophilic to superhydrophobic through a combination of polymeric coatings and microstructuring of surfaces.

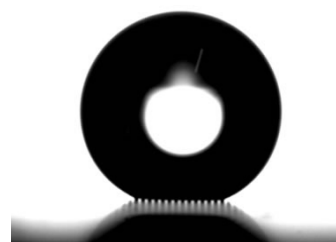


Fig. 1: Example of a superhydrophobic surface generated by combining microengineered post surfaces with an ultrathin fluoropolymer coating.

References

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