CHEMISTRY ON THE NANOMETER-SCALE – ELECTRO-OXIDATIVELY GENERATED NANOMETER PATTERNS FUNCTIONALIZED BY SELF-ASSEMBLED MONOLAYERS

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The use of chemically active surface templates to perform chemical reactions and self-assembly on the nanoscale has been identified as a powerful approach towards nanofabrication. The structures are inscribed to a self-assembled monolayer of *n*-octadecyltrichlorosilane (OTS) by means of a conductive SFM tip, which locally initiates the electrochemical oxidation of the terminal $-CH_3$ groups of the monolayer into reactive –COOH groups.[1] They provide chemically active surface templates with a resolution down to ~ 10 nm and allow for the site-selective assembly of additional (functional) monolayers, the self-assembly of nanomaterials (e.g. nanoparticles and nanotubes) and the performance of chemical reactions directly on the structures.[2]

The combination of different modification schemes and the sequential patterning of the OTS monolayer represents a powerful toolbox for nanofabrication consisting of functionalization approaches that hold promises to develop strategies to assemble complex device features. We provide an overview about recently developed modification strategies, including click chemistry functionalization on nanometer scale patterns, the site-selective growth of polymer brushes on functional precursor monolayers and the combination of different monolayers to pattern surfaces sequentially with different chemical functionalities (Figure 1). Different examples will be highlighted.

These modification schemes are seen to be important building blocks towards the step-by-step fabrication of functional device features.

References:

[1] R. Maoz, E. Frydman, S.R. Cohen, J. Sagiv, Adv. Mater., **12** (2000) 725

[2] D. Wouters, S. Hoeppener, U.S. Schubert, Angew. Chem. Int. Ed., **48** (2009) 1732

Figures:

Figure 1. Different modification approaches to obtain functional nanostructures.