Chemistry depending surface conditioning and its implication for colonization by microorganisms

I.Thomé[1*], M. E. Pettitt[2], S. Kirchen[1], T. Schwarz[1], S. Heissler[1], M. E. Callow[2], J.A. Callow[2], G. Swain[3], M. Grunze[1,4] and A. Rosenhahn[1,4]

[1] Institute for Functional Interfaces, IFG, Karlsruhe Institute of Technology, PO Box 3640, 76021 Karlsruhe, Germany
[2] School of Biosciences, University of Birmingham, Birmingham B15 2TT, United Kingdom
[3] Department of Marine and Environmental Systems, Florida Institute of Technology, 150 W. University Blvd Melbourne, Florida 32901, USA
[4] Applied Physical Chemistry, Ruprecht-Karls-University Heidelberg, Im Neuenheimer Feld 253, 69120 Heidelberg, Germany

*e-mail: Isabel.Thome@pci.uni-heidelberg.de

Biofouling is a ubiquitously occurring phenomenon in tidal zones worldwide [1]. To prevent unwanted effects caused by biofouling, suitable non-toxic coatings for these environments are required. Changing the surface chemistry and the composition of a coating changes not only its properties but also the formation and composition of a conditioning layer. We use self-assembled monolayers (SAMs) on gold as highly controlled surface chemistries which allow to fine tune the physicochemical surface properties. In order to correlate colonization with surface conditioning, we varied the surface chemistry and thus their wetting properties. In agreement with previous work, chemical termination of the surface affects not only the settlement kinetics of spores of the macrofouler *Ulva linza* [2] but also the settlement of other species. As different SAMs have different affinity towards macromolecules, settlement is controlled by both, surface chemistry itself and an adsorbed conditioning layer. To disentangle both effects, formation of conditioning layers depending on the surface chemistry was investigated in greater detail by spectral ellipsometry and IRRAS. Organism settlement is significantly changed if pristine chemistries are compared to conditioned surfaces.

[1] M.E. Callow, J.A. Callow, J.D. Pickett-Heaps, R. Wetherbee, “Primary Adhesion of Enteromorpha (Chlorophyta, Ulvales) Propagules: Quantitative Settlement Studies and Video Microscopy”, *J. Phycol*., **1997**, *33*, 938.

[2] M. E. Callow, J. A. Callow, L. K. Ista, S. E. Coleman, A. C. Nolasco, G. P. López, “Use of self-assembled monolayers of different wettabilities to study surface selection and primary adhesion processes of green algal (*Entero-morpha*) zoospores“, *Appl. Environ. Microbiol*., **2000**, *66*, (8), 3249-3254.