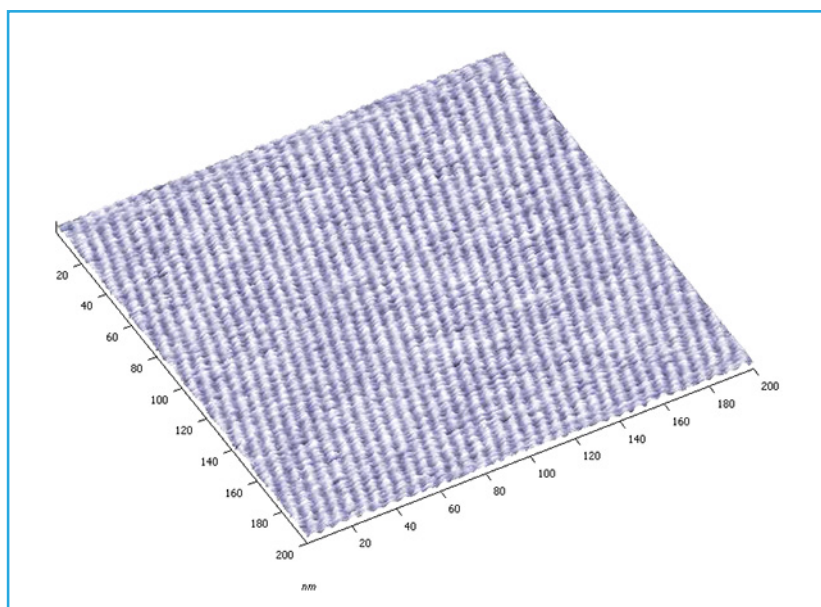




Surfactant micelles in aqueous solution: critical resolution in AFM

It's a widely spread idea that performing AFM in liquids is a rather complicated research approach. Actually, many tasks related to the investigation of molecular structures and complexes in a liquid environment claim high demands on the SPM equipment. The picture below shows an AFM scan of surfactant molecules dynamically self-assembled into parallel, hemicylindrical micelles on a hydrophobic graphite surface.



Sample: 10 mM aqueous solution of cetyltrimethylammonium bromide

surfactant in contact with HOPG.

AFM equipment: [NTEGRA Prima](#), Constant force imaging mode in liquid cell using a very low set point ("soft contact mode" – force ~100pN).

AFM probe: [CSG01](#), 0.03 N/m

Author: Hannes Schniepp, The College of William and Mary, Williamsburg, VA, USA.

Observation of the dynamically self-assembled molecular structure in this case was a challenge. The imaging mode used is the "soft contact mode" – scanning with constant force using a very low set point. The vertical force of the probe needs to be kept as close as possible to the set point, in this case ~ 100 pN. If the force exceeds this value, the native molecular assembly will be disturbed (the periodicity of the micelles is ~5 nm.). For lower forces, the contrast vanishes. Note that the vertical topography modulation is only 0.1-0.2 nm, but still significantly above the noise level. This example shows also that [NTEGRA nanolaboratory](#) provides enough sensitivity and stability to study dynamic molecular structures in an aqueous environment.