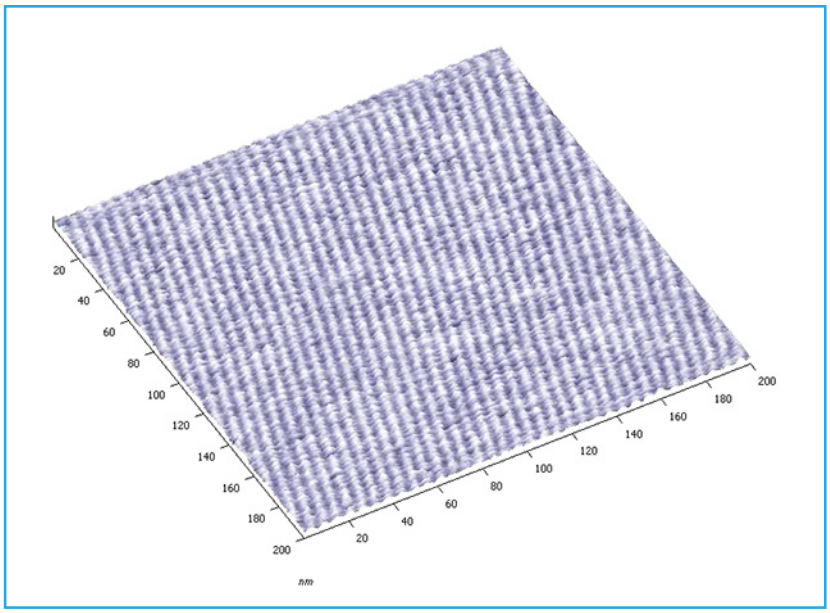
Surfactant micelles in aqueous solution: critical resolution in AFM

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*
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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.