Formation of Kinetically Stable, Flat Lying Thiolate Monolayers

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Figure I. The time dependence of the apparent thickness (as determined by ellipsometry) as well as the contact angle (advancing, for water) show that the monolayer obtained from the thioacetates must mostly consist of flat lying molecules and remains stable even after prolonged immersion times.
Figure II. XP spectra recorded for monolayers formed on polycrystalline gold substrates showing the carbon 1s, gold 4f, oxygen 1s region and sulfur 2p region for monolayers formed by immersion into ethanolic solutions of thioacetate (C\textsubscript{12}SAc) and thiol (C\textsubscript{12}SH) for about 12 h. The chemical shift C1s signals for the flat laying molecules is as expected for methylene groups in direct contact with metal surfaces. The much more pronounced O1s signal for the flat lying phase hints on an increased chemical reactivity of the exposed sulfur atoms in the flat lying phase.
Figure III. C1s NEXAFS spectra of thiolate films formed from a) C$_{12}$SAc and b) C$_{12}$SH for different angles of incidence of the synchrotron light. Again the spectra of the films formed from the thioacetate clearly show the signs of flat lying hydrocarbon chains.
Figure IV. STM data obtained for the upright phase in the monolayers obtained from C_{12}SAc solutions. On the upper left hand the islands of limited size become distinguishable; b) shows a close-up of these areas. The line scans in c) and d) verify the intermolecular distances of the typical (2\sqrt{3}x3) structure.