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Structures of Silane SAMs on Oxide Surfaces

While the structure of thiols on crystalline gold is dominated by the strong covalent bond between gold and sulfur atoms promoting an epitaxial coverage, the situation is much more delicate for silanes on crystalline or amorphous oxide surfaces due to the complex headgroup-surface interaction competing with the chain-chain interaction. By synchrotron X-ray reflectivity and grazing incidence diffraction we have obtained a hitherto unknown detailed picture of the structural relations between SAMs and substrate. These feature a novel rotational epitaxial relationship in case of a crystalline oxide surface. A full account of the structure in case of the amorphous native oxide of silicon calls for an oxygen depleted layer at the Si/SiO₂ junction. In both cases cross-linking between the head groups is a salient structural feature.

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