

Abstract

This work aimed at the utilization of chemical principles for stabilization of self-assembled monolayers (SAMs) of carboranethiol derivatives on a flat gold surface. Ideas employing surface confined coordination complex formation and dipole-dipole intermolecular interactions were outlined and the respective literature survey was compiled. Preliminary experiments were carried out to test for their feasibility and surfaces modified with self assembled monolayers proved very sensitive to reaction conditions ordinarily used for bulk synthesis. The chemical sensitivity of the studied surfaces, the necessity of using appropriate surface-sensitive analytical techniques and the depth of the problem initially defined made this task both advanced and challenging. The formation of intermolecular coordination complexes with ω -carboxylated SAMs of *meta*-carborane-9-thiol was chosen to answer those issues, extending the previous work of the author on carboxylated carboranethiol isomers presented in his bachelor thesis. Concepts different of those based on coordination chemistry are briefly discussed as well, but more as prospects for future work and to present this work in a broader context to which it belongs.

Characterization of molecules assembled on a surface in a single layer requires surface sensitive techniques, for the number of molecules per surface area is relatively small. For example a SAM of 1-carboxy-*meta*-carborane-9-thiol on gold flat surface contains less than a nanomole per cm^2 . X-ray photoelectron spectroscopy (XPS) was used as a convenient method for this study, not only as a tool for qualitative analysis as is common in the literature on SAMs, but also to asses some quantitative information on the formation of surface confined metal complexes. Discussion on some specific difficulties stemming from quantitative XPS analysis of SAMs is provided in this thesis. Dynamic contact angle measurements were used as means of probing the qualitative changes in the preliminary experiments.