

Deuteriated Tetraalkylstannanes and Covalent Trialkylstannyl Salts and an Examination of their Adsorption on Gold

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Alkyl residues can be attached directly to a gold surface by treatment with tetraalkylstannanes and covalent trialkylstannyl or dialkylstannyl salts of p-toluenesulfonic and similar acids. Stannanes containing four to no CH₃ groups and one to four longer alkyl chains in the molecule have been synthesized and used for the purpose. They were tested for alkylation of gold from solution under ambient conditions and the self-limiting monolayers were characterized using ellipsometry, PM-IRAAS and XPS spectroscopy, contact angle, and electrode-blocking measurements. All of these alkylstannanes form similar covalently adsorbed monolayers containing longer alkyl chains attached directly to gold and no tosyl groups or short alkyl chains (methyl, ethyl). In many but not all cases tin atoms in the form of an oxide are also left on the surface. The stability of the alkyl monolayers to heat, solvents, bases, acids, oxidants and reductants is comparable to or better than that of a 1-octadecanethiol monolayer, even though they are less dense and less well organized. In order to elucidate the details of the attachment structure, we have synthesized a series of fully or selectively deuteriated tetrabutylstannanes whose C-D stretch intensities in the IR we expect to provide separate information on the average orientation of each methylene group in the adsorbed *n*-butyl chains relative to the plane of the gold surface. These syntheses will be discussed.

Acknowledgment. The research leading to these results has received funding from the European Research Council under the European Community's Seventh Framework Program (FP7/2007-2013) / ERC grant agreement no. 227756 and was also supported by the Inst. of Organ. Chem. and Biochem., Acad. of Sciences of the Czech Republic RVO: 61388963.