Fluorinated monolayer for metal ion extraction

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A new fluorinated amphiphilic molecule of formula $C_8F_{17}(CH_2)_2S(CH_2)_2CON(CH_3)_2$ ($C_8F_{17}$THAM) was investigated in terms of ability to form insoluble monolayer at the air/water interface. Isotherms of $C_8F_{17}$THAM molecules were registered depending on the background salts concentration ($LiNO_3$) and on the presence of metallic ions (such as $Fe^{3+}$ and $Cu^{2+}$) in the subphase. A strong specific interaction was observed with the metal ions, which is likely to be due to complexation between the metallic ions and the polar head of the amphiphilic molecule.

The transfer of these monomolecular films to a solid surface (glass plate or silicon wafer) by deep coating [1] was studied. Single and multi layer deposition of $C_8F_{17}$THAM were obtained. The films deposited on the substrate were characterized by x ray reflectivity on silicon substrates and polarized light microscopy on Nanolane® substrates (a new technology that increases the sensitivity of standard optical microscope based on the use of contrast-enhanced supports) to evaluate their thickness and the homogeneity. The presence and the nature of the metal ions deposited on the substrate were highlighted by x-ray photoelectron spectroscopy (XPS). Such a molecule could be used by this technique for metal ion detection in water.

1 K.B. Blodgett, J. Am. Chem. Soc. 57 (1935) 1007