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Characterization of Self-Assembly Behavior of 1-Dodecylamine Molecules on Au (111) Surface

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Abstract : Self-assembled characteristics and adsorption performance of 1-dodecylamine molecules on gold (Au) (111) surfaces were characterized via cyclic voltammetry (CV), surface-enhanced infrared absorption spectroscopy (SEIRAS) and scanning tunneling microscopy (STM). The present study focused on the formation of 1-dodecylamine (DDA) on a gold surface with respect to the ex-situ arrangement of an adlayer on the Au(111) surface, and phase transition at potential dynamics carried out by EC-STM. This study reveals that alkyl amine molecules were formed an adsorption pattern with highly regular "lie down shape" on Au(111) surface, even in an extreme acid system (pH = 1). Acidic electrolyte ($HClO_4$) could protonate the surface of alkyl amine of a monolayer of the gold surface when potential shifts to negative. The quite stability of 1-dodecylamine on the gold surface maintained the monolayer across the potential window (0.1-0.8V). This transform model was confirmed by EC-STM. In addition, amine-modified Au(111) electrode adlayer used to examine how to affect an electron transfer across an interface using $[Fe(CN)_6]^{3-}/[Fe(CN)_6]^{4-}$ redox pair containing 0.1 M $HClO_4$ solution.

Keywords : cyclic voltammetry, dodecylamine, gold (Au)(111), scanning tunneling microscopy, self-assembled monolayer, surface-enhanced infrared absorption spectroscopy
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