

Physico-Chemical nanomaterials science

Influence of surface functionalization of Au(111) surface on its wetting properties

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Water-containing technologies, which are based on water\solid interfaces, require put the request for surfaces with a certain degree of hydrophilicity (hydrophobicity) [1]. Wetting properties of surfaces are defined by chemical composition of adsorbed substances (hydrophilic or hydrophobic compounds) and their morphology [1]. The purpose of the study was to determine influence of chemical composition of the adsorbates and substrates morphology on wetting properties of the surface.

In this work the Au(111) surfaces were used as substrates. Substrates were modified by n-alkanethiols and its derivatives deposited from solution. Bonding of adsorbates with the substrate performed by interaction thiols head group (-SH) and Au atoms [2]. End groups of the molecules contained hydrophilic or hydrophobic functional group. Scanning tunneling microscopy (STM) was used for investigation of surface morphology. Our experiments showed that increasing of adsorption time leads to an increase in value of the contact angle and, consequently, the weakening hydrophilic surface properties. We showed that the presence of hydrophilic groups on the surface increased wettability. The results demonstrate that hydrophilicity of the surface strongly depends on the length of alkyl chain. The increasing of aliphatic chain leads to increasing of hydrophobicity. It has been suggested, that the observed effect is due to peculiarities of molecular self-assembly.

Investigations of n-alkanethiols monolayers suggested that wetting properties of the surface depend on degree of molecular ordering.

1. Barry Arcles. Hydrophobicity, Hydrophilicity and Silane Surface Modification. – Morrisville: Gelest inc. -84 p.
2. N. Battaglini, H. Klein, Ph. Dumas, C. Moustrou, A. Samat. Scanning tunneling microscopy of locally derivatized self-assembled organic monolayers // Applied Surface Science.-2003. -**212–213**. –P. 481–484.