

Features of formation copper nanoparticles monolayers in a mixture of polyvinylpyrrolidone and arachidic acid

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Nanostructured materials which can be prepared by direct synthesis, crystallization or self-assembly methods e.g. Langmuir-Blodgett method (LB) have great potential, particularly as highly conductive transparent contact layers in photovoltaic applications and photo-emitting elements and devices [1]. In this work, we investigated formation and properties of Langmuir films based on copper complexes with arachidic acid (Arh) and polyvinylpyrrolidone (PVP) by the compression isotherm analysis. In the first series of experiments we have obtained compression isotherms for monolayers of 10^{-3} M chloroform solutions of Cu-nanoparticles in polyvinylpyrrolidone stabilizer – CuNPs-PVP (Fig. 2, curve 1). In the other series of experiments we used CuNPs-PVP-Arh chloroform solutions with molar ratio of the [CuNPs-PVP]:[Arh] system being 1:1 to form monolayers (Fig. 2, curve 2). Lower area of condensed state in solution 1 can be explained by lower stability of the monolayer due to CuNPs-PVP molecules transferring to the water subphase as PVP is more water-soluble than arachidic acid. Thus, monolayers of solution 2 are more preferable for monolayer formation and its transfer to solid substrate.

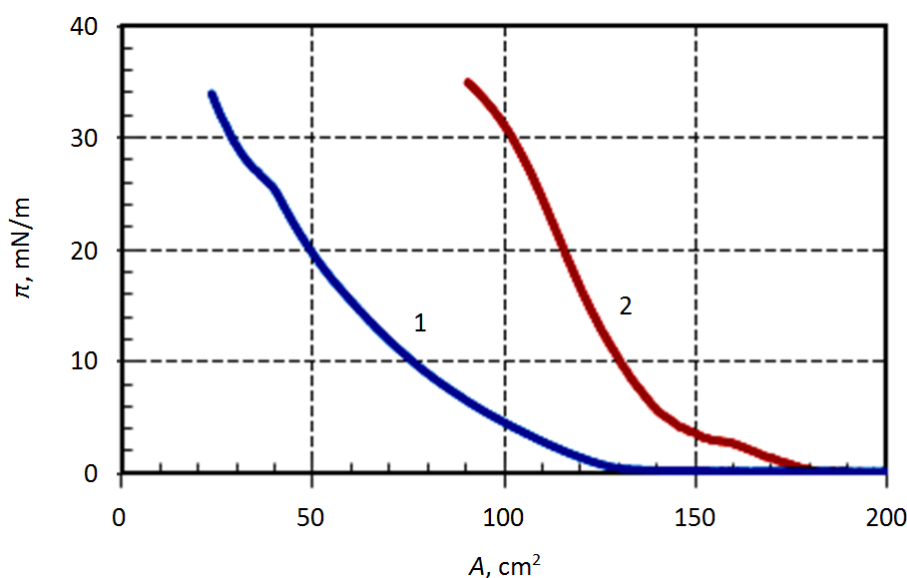


Figure 1 Compression isotherms of monolayers: 1 – CuNPs-PVP (solution 1); 2 – CuNPs-PVP-Arh (solution 2)

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[1] T.H. Bointon, S. Russo, M. F. Craciun. *IET Circuits, Devices & Systems*, 2015, 9 (6), 403.