

Surface modification of mica by magnetron sputtering deposition of thin metallic coatings

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Tobacco mosaic virus (TMV) has been used as a model object for the development of a technique of surface modification of mica substrates, which are intended for atomic force microscopy (AFM) investigation of protein-containing particles of nanometer size. The surface modification has been performed by direct current (DC) magnetron sputtering of gold in argon, while chromium has been employed as a material of an adhesion-promoting layer. Adsorption of TMV has been performed at pH 7.4 onto three types of AFM substrates: highly oriented pyrolytic graphite (HOPG), 3-aminopropyltriethoxysilane (APTES)-modified mica, and mica with magnetron sputtered gold coating. HOPG has been employed as a reference substrate. In the case of gold-coated mica, the number of surface-bound viral particles was about ten times greater than in the case of APTES-modified mica. In addition, the height of TMV particles on APTES-modified mica was lower than that on both HOPG and gold-coated mica. The technique proposed herein can be of use in the development of biosensor devices and in the single-particle studies of various viruses.

Keywords: tobacco mosaic virus; atomic force microscopy; protein adsorption; magnetron sputtering, metallic coatings.

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