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Repulsive effects of hydrophobic diamond thin films on biomolecule detection

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### Abstract

The repulsive effect of hydrophobic diamond thin film on biomolecule detection, such as single-nucleotide polymorphisms and human immunodeficiency virus type 1 trans-activator of transcription peptide protein detection, was investigated using a mixture of a fluorine-, amine-, and hydrogen-terminated diamond surfaces. These chemical modifications lead to the formation of a surface that effectively resists the nonspecific adsorption of proteins and other biomolecules. The effect of fluorine plasma treatment on elemental composition was also investigated via X-ray photoelectron spectroscopy (XPS). XPS results revealed a fluorocarbon layer on the diamond thin films. The contact angle measurement results indicated that the fluorine-treated diamond thin films were highly hydrophobic with a surface energy value of  $\sim 25$  mN/m.

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