Atomic Force Microscopy Study on Correlation between Electrical Transport and Nanomechanical properties of Graphene Layer

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Graphene, the building block of graphite, is one of the most promising materials due to their fascinating electronic transport properties. The pseudo-two-dimensional sp2 bonding in graphene layers yields one of the most effective solid lubricants. In this poster, we present the correlation between electrical and nanomechanical properties of graphene layer grown on Cu/Ni substrate with CVD (Chemical Vapor Deposition) method. The electrical (current and conductance) and nanomechanical (adhesion and friction) properties have been investigated by the combined apparatus of friction force microscopy/conductive probe atomic force microscopy (AFM). The experiment was carried out in a RHK AFM operating in ultrahigh vacuum using cantilevers with a conductive TiN coating. The current was measured as a function of the applied load between the AFM tip and the graphene layer. The contact area has been obtained with the continuum mechanical models. We will discuss the influence of mechanical deformation on the electrical transport mechanism on graphene layers.