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Scanning Tunnelling Microscopy Investigation of Naturally Occurring Graphite Surface

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Abstract

Scanning Tunnelling Microscopy (STM) has emerged as a powerful tool for investigating the potential of graphene as a substrate for molecular absorption, attracting considerable attention in nanotechnology and materials science. In this study, the molecular absorption characteristics of graphene utilizing a cutting-edge STM system were observed. STM images of graphene on both graphite surfaces and commercially available Highly Ordered Pyrolytic Graphite (HOPG) at room temperature were obtained and compared. Naturally occurring graphite samples from Sri Lanka were used To ensure the highest level of purity. These samples are renowned for their exceptional purity. The STM system was used to acquire constant current and height mode images for three samples, including commercially prepared HOPG and the naturally occurring graphite samples. The naturally occurring sample exhibited the distinctive honeycomb structure of graphene with minimal distortion, indicating its superior quality at low sample bias conditions. The STM images obtained for the commercially prepared HOPG samples were comparable to those of the naturally occurring samples, affirming their high quality and limited presence of surface defects and faults. Overall, the results of this study underscore the significance of STM analysis in unravelling the molecular absorption properties of graphene. Moreover, they highlight the immense potential of graphene as a promising substrate for diverse applications, such as molecular electronics, catalysis, and sensing. The insights gained from this research pave the way for future advancements in graphene-based nanotechnology.

Keywords: *Graphite, Scanning tunnelling microscope, Surface*