Topography control over graphenes with single macromolecules

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Precise control over the topography of graphenes on solid supports is of considerable interest, e.g., for strain engineered graphene electronics. Graphene may be exfoliated onto a pre-patterned surface, such that a strongly adhering graphene would replicate the substrate surface. Here we employed a mechanical exfoliation technique, which allowed to largely avoid the otherwise observed contaminations entrapped at the graphene-substrate interface, and which also affect the graphene topography. For example, contaminated graphenes exfoliated on freshly cleaved and atomically flat mica surface exhibit plateaus of a sub-nanometer height. The clean exfoliation, on the other hand, results in atomically flat graphenes over large areas. Exfoliated onto mica surfaces coated with vector DNA or dendronized polymers, they replicate the topography of the molecules with nanometer precision, as deduced from intermittent contact and contact mode scanning force microscopy images.

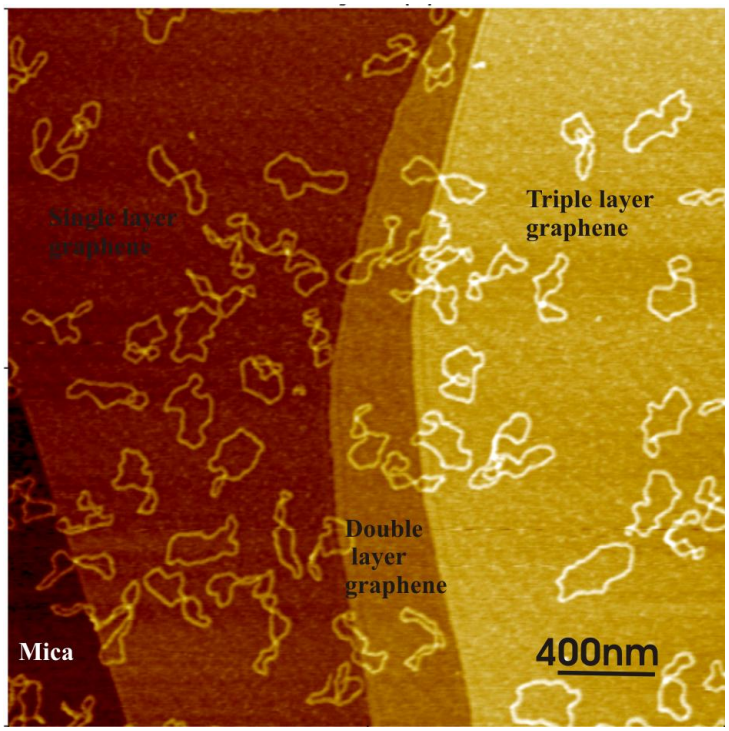

Figure: Topography of graphenes exfoliated onto mica surface covered with vector DNA molecules as imaged with a Scanning Force Microscope.