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Spreading of water nanodroplets on graphene JOSEPH ANDREWS, SHAYANDEV SINHA, PETER CHUNG, SIDDHARTHA DAS, Univ of Maryland-College Park — Understanding the wetting of 2D materials is central to the successful application of these materials in a variety of disciplines that involve the interaction of a liquid with such layered substrates. Recent studies focusing on wetting statics and contact angle selection on graphene-coated solids indicate a wetting translucent behavior of graphene. However, little research has been done on the wetting dynamics of graphene-coated systems. Here, we simulate the wetting dynamics of water drops on free-standing graphene layers using a molecular dynamics framework. We employ the extended simple point charge (SPC/E) model to simulate the water drops. Our simulations are validated against the experimental results of water drop contact angles on graphite. Unlike many existing MD studies, we obtain the results starting from a physical consideration of spherical water drops. We observe the half power law for the spreading dynamics, i.e., r~t^(1/2) (r is the spreading radius and t is the spreading time). Identical spreading laws have been identified for Lennard Jones (LJ) nanodroplets on non-layered surfaces; therefore, we establish that the change in the nature of the substrate (non-layered to 2D) and the liquid (LJ to water) does not alter the physics of wetting dynamics of nanodroplets.

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