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Wetting of water on graphene

In contemporary literature, the wetting properties of graphene have proven to be controversial and difficult to assess; especially, whether the presence of a thin molecular layer such as graphene influences the adhesion of a solid phase. In this work, we directly measure the water adsorption in graphene nano-powder flakes of different thicknesses in a novel experimental approach, which shows that the thinnest of graphene flakes do not adsorb water. Thicker flakes of graphene nano-powder, on the other hand, do adsorb water. Calculation of the van der Waals interactions in this system confirms that the adhesive interactions between graphene and water are very weak, which makes graphene super hydrophobic. Subsequent 'liquid marble' tests with graphene nano-powder flakes establish this super hydrophobicity. Our work affirms the much debated 'wetting transparency' property of graphene, implying that a single graphene layer on top of a substrate does not affect the adhesion between a wetting phase and the substrate.

Biography

Daniel Bonn completed his PhD in University of Amsterdam, Dept. of Chemistry in 1993 and MSc at University of Amsterdam, Dept. of Chemistry, and MSc in Physical Chemistry in 1990. Since 2003, he has worked as a Professor of Physics (part-time) at the van der Waals-Zeeman Institute, University of Amsterdam. His current research interests include "Complex fluids, rheology, glasses, surface phase transitions, instabilities, and turbulence". He has over 90 publications in refereed journals.

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