

Abstract Submitted
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Anomalous response of supported few-layer hexagonal boron nitride to DC electric fields: a confined water effect?¹ CAMILLA OLIVEIRA, MATHEUS MATOS, MÁRIO MAZZONI, HÉLIO CHACHAM, BERNARDO NEVES, Universidade Federal de Minas Gerais-UFMG — Hexagonal boron nitride (h-BN) is a two-dimensional compound from III-V family, with the atoms of boron and nitrogen arranged in a honeycomb lattice, similar to graphene. Unlike graphene though, h-BN is an insulator material, with a gap larger than 5 eV. Here, we use Electric Force Microscopy (EFM) to study the electrical response of mono and few-layers of h-BN to an electric field applied by the EFM tip. Our results show an anomalous behavior in the dielectric response for h-BN for different bias orientation: for a positive bias applied to the tip, h-BN layers respond with a larger dielectric constant than the dielectric constant of the silicon dioxide substrate; while for a negative bias, the h-BN dielectric constant is smaller than the dielectric constant of the substrate. Based on first-principles calculations, we showed that this anomalous response may be interpreted as a macroscopic consequence of confinement of a thin water layer between h-BN and substrate. These results were confirmed by sample annealing and also also by a comparative analysis with h-BN on a non-polar substrate.

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