Abstract Submitted
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Resolving 2D Amorphous Materials with Scanning Probe Microscopy[1] KRISTEN M. BURSON, CHRISTIN BUECHNER, ADRIAN LEWANDOWSKI, MARKUS HEYDE, HANS-JOACHIM FREUND, Fritz-Haber Institute of the Max Planck Society — Novel two-dimensional (2D) materials have garnered significant scientific interest due to their potential technological applications. Alongside the emphasis on crystalline materials, such as graphene and hexagonal BN, a new class of 2D amorphous materials must be pursued. For amorphous materials, a detailed understanding of the complex structure is necessary. Here we present a structural study of 2D bilayer silica on Ru(0001), an insulating material which is weakly coupled to the substrate. Atomic structure has been determined with a dual mode atomic force microscopy (AFM) and scanning tunneling microscopy (STM) sensor in ultra-high vacuum (UHV) at low temperatures, revealing a network of different ring sizes. Liquid AFM measurements with sub-nanometer resolution bridge the gap between clean UHV conditions and the environments that many material applications demand. Samples are grown and characterized in vacuum and subsequently transferred to the liquid AFM. Notably, the key structural features observed, namely nanoscale ring networks and larger holes to the substrate, show strong quantitative agreement between the liquid and UHV microscopy measurements. This provides direct evidence for the structural stability of these silica films for nanoelectronics and other applications.

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