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Distinguishing between microscale gaseous bubbles and liquid drops BENG HAU TAN, HONGJIE AN, CHON U CHAN, CLAUS-DIETER OHL, Nanyang Technological University — In recent years, there has been strong research interest in decorating surfaces with tiny bubbles and drops due to their potential applications in reducing slippage in micro and nanofluidic devices. Both nanobubbles and nanodrops are typically nucleated by exchanging fluids over a suitable substrate. However, the nucleation experiments present many challenges, such as reproducibility and the possibility of contamination. The use of one-use plastic syringes and needle cannulas in nucleation experiments can introduce polymeric contamination. A contaminated experiment may nucleate bubbles, drops or both. Moreover, it is surprisingly difficult to distinguish between bubbles and drops under the usual atomic force microscopy or optical techniques. Here we present an experimental study comparing bubbles and oil (PDMS) drops on an atomically smooth surface (HOPG). Instead of nucleating the objects via solvent exchange, we directly introduced bubbles via electrolysis, and oil drops by injecting a dilute solution. Contrary to previous reports, we find that under careful AFM characterisation, liquid drops and gaseous bubbles respond differently to a change in imaging force, and moreover present different characteristic force curves.

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