Dynamics of Water Droplet at the Nanoscale

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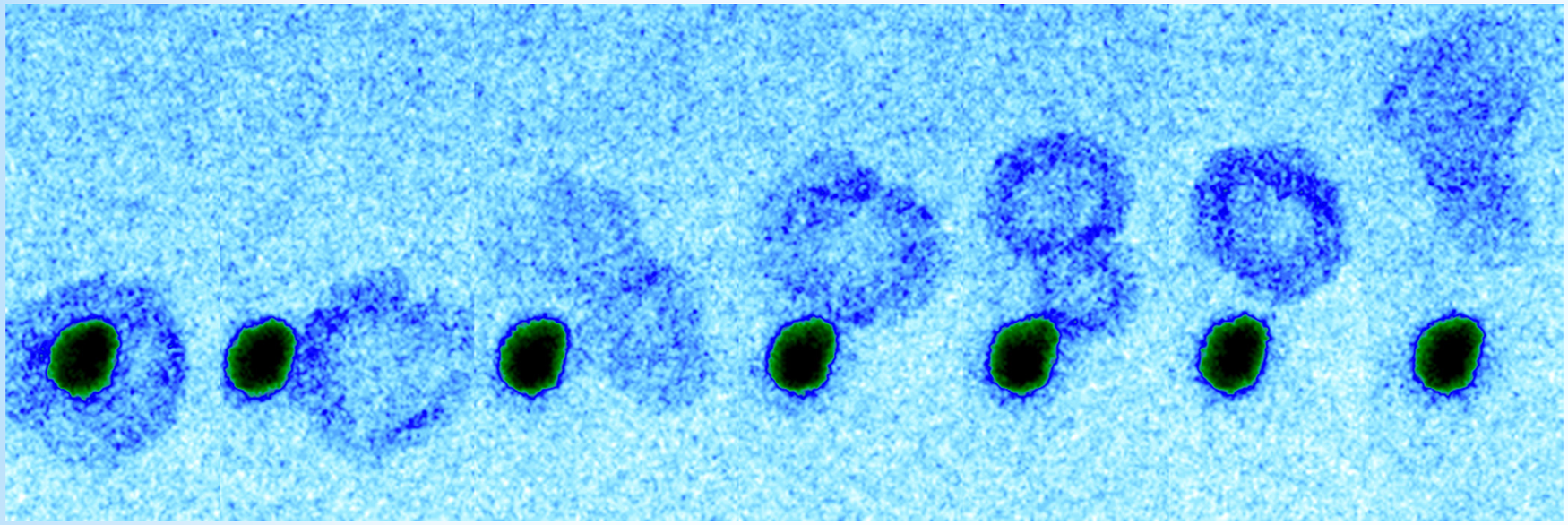
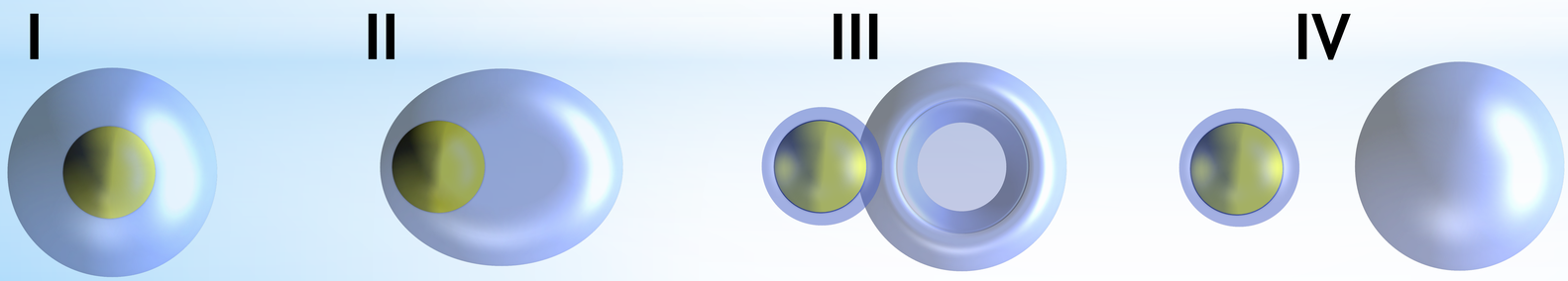


Water nanodroplet (dark blue) ~ 20 nm in diameter depins from a 10 nm gold nanoparticle (black) and continues on its way. A nanodroplet of this size contains about 1.4 million water molecules.



Schematic diagram of water nanodroplet depinning from nanoparticle.

Not often does one get to see an actual nano-sized water droplet, much less a moving one. With the transmission electron microscope, we can now visualize the dynamics of a ~20 nm water nanodroplet sliding on a silicon nitride substrate in a stick-slip manner.

Due to electrostatic interactions with the electron beam, the nanodroplet spontaneously adopts a doughnut / concave shape and undergoes stochastic lateral stick-slip dynamics.

The original monochromatic EM images are contrasted here in blue, as inspired by the creative artwork of toddlers armed with ink stamps: an imagination coming alive at the smallest of length scales.