Nanoparticle Self-structuring in a Nanofluid Film Spreading on a Solid Surface

Alex D. Nikolov, Kirti Kondiparty and Darsh T. Wasan

MOVIE DESCRIPTION

Movie Clip 1: Stratification of a Nanofluid Film formed on a Solid Surface

The video clip depicts stratification (i.e., layer by layer thinning) of a nanofluid film of silica suspension (particle size of 19 nm) between an oil drop and glass surface. An oil drop of canola oil, when expelled into the bulk nanofluid, approaches the glass surface forming a nanofluid film (96 μm) corresponding to the drop with an equatorial diameter of ~300 μm and rolls under the glass surface for a while. A dimple with a horseshoe shape is formed as seen in the first video scene. In the next scene, the film thins in a stepwise fashion and areas with different colors appear depicting the different film thicknesses: film with one-particle layer seen as a bright green color, with two-particle layers seen as green color, with three-particle layers seen as dark green, and film with four particle layers seen as black. With time the film reduces its thickness in a stepwise manner and the number of particle layers reduces from four to three as seen in the last part of the video clip.