Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

How wettability controls nanoprinting . JOEL DE CONINCK, University of Mons — Using large scale molecular dynamics, we study in detail the impact of nanometer droplets of low viscosity on substrates and the effect of the wettability between the liquid and the plate. We show the maximal contact diameter during the nanodroplet impact (Dmax) as well as the time required to reach it (tmax) agree with experimental data at the macroscale showing similarities between droplet impacts at the nano and the macro scales. The comparison between the MD simulations and different models reveals that most of these models do not consider all the effects we observe at the nanoscale. Moreover, most of their predictions for the impact at the nanoscale do not correspond to the simulation results. We have developed a new model for Dmax which agrees not only with the simulation data but also the experimental observations and it also considers the effects of the liquid-solid wettability. We also propose a new scaling for tmax with respect to the impact velocity which is also in agreement with the experimental observations. We then present a new way to collapse in a master curve the evolution of the micro to nanometer drop contact diameter during impact for different wettabilities and different impact velocities.

Joel De Coninck
University of Mons

Date submitted: 01 Aug 2019 Electronic form version 1.4