

Abstract Submitted  
for the DFD20 Meeting of  
The American Physical Society

**“Stick-slip” or “Stick-break?”: Stiffness Mediated Magnetowetting Dynamics of Sessile Droplets** BHASKARJYOTI SARMA, AMARESH DALAL, DIPANKAR NARAYAN BASU, Indian Institute of Technology Guwahati — We experimentally demonstrate the alteration in the magnetowetting dynamics of sessile ferrofluid (water-based) droplets, placed atop elastomeric surfaces of different stiffness, in a non-uniform magnetic field. Although the deformation and subsequent splitting dynamics of the ferrofluid droplets are analogous to the previous studies involving rigid substrates, the characteristics of the concerned events are greatly influenced by the stiffness of the substrates. For example, the experiments reveal that rigid substrates facilitate a sharp decrease in the contact radius of the droplet during its deformation. In contrast, the soft substrates favor substantial decrease in the dynamic contact angle, measured around the air-water-solid three-phase contact line (TPCL). Further, the TPCL experiences a shift from “stick-slip” to the “stick-break” regime, with a decrease in the stiffness of the underlying substrate. The energetic arguments indicate that the above transition is governed by the dynamics of the “wetting-ridge” formed around the TPCL. The stiffness also affects the size of the secondary droplets produced from the splitting. The study is expected to shed light on the interaction of soft mediums and ferrofluid droplets in a magnetic field.

Bhaskarjyoti Sarma  
Indian Institute of Technology Guwahati

Date submitted: 09 Aug 2020

Electronic form version 1.4