Abstract Submitted
for the DFD16 Meeting of
The American Physical Society

Visualization of the Cassie–Wenzel transition with X-ray microscopy[1] SU JIN LIM, YESEUL KIM, SKKU Advanced Institute of Nanotechnology (SAINT), Sungkyunkwan University, SUYEON JEONG, CHANGHYUN PANG, School of Chemical Engineering, Sungkyunkwan University, BYUNG MOOK WEON[2], School of Advanced Materials Science and Engineering, SKKU Advanced Institute of Nanotechnology (SAINT), Sungkyunkwan University — Water droplets on hydrophobic surfaces with micropillar usually exhibit two wetting states: (i) the Cassie state when air is trapped between water and micropillars and (ii) the Wenzel state when air is completely replaced by water. A transition from the Cassie to the Wenzel states is essential in designing stable hydrophobic surfaces. Directly visualizing the Cassie-Wenzel (C-W) transition is difficult with conventional microscopies because of no transparency from micropillars. Here we suggest a powerful technique based on high-resolution high-penetration X-ray microscopy for clearly visualizing the C-W transition. Thanks to the X-ray penetrating into the opaque micropillars, we were able to directly explore the intermediate state during the C-W transition. We study on the transition dynamics regarding how air replacement by water was gradually propagated with position and time. We believe that the replacement dynamics would be explained as a kind of phase transition kinetics.

[1]This research was supported by Global Ph.D Fellowship Program and Basic Science Research Program through the National Research Foundation of Korea (NRF) funded by the Ministry of Education (NRF-2015H1A2A1034133) (NRF-2016R1D1A1B01007133).
[2]Email: bmweon@skku.edu

Su Jin Lim
SKKU Advanced Institute of Nanotechnology (SAINT), Sungkyunkwan University

Date submitted: 28 Jul 2016 Electronic form version 1.4