Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

In Situ Identification of Dewetting-Induced Large-Scale Deformation of Vertically Aligned Single-Walled Carbon Nanotubes[1] YUTA YOSHIMOTO, KOICHI ISOMURA, SOU SUGIYAMA, HUA AN, Department of Mechanical Engineering, The University of Tokyo, TAKUMA HORI, Department of Mechanical Engineering, Tokyo University of Science, TAIKI INOUE, SHOHEI CHIASHI, SHU TAKAGI, SHIGEO MARUYAMA, IKUYA KINEFUCHI, Department of Mechanical Engineering, The University of Tokyo — We investigated dynamical processes of capillary-mediated deformation of vertically aligned single-walled carbon nanotubes (VA-SWCNTs) via *in situ* observation of their wetting and dewetting behaviors using an environmental scanning electron microscope. Three types of wetting behaviors on a VA-SWCNT sample were observed, namely conical shaped water aggregates, spherical droplets on tips of conical shaped water aggregates, and extensively distributed water layers. The former two types both resulted in dimples on the VA-SWCNT surface, failing to induce large-scale deformation of VA-SWCNTs. In contrast, the latter caused the formation of wall-like structures and crack propagation in the VA-SWCNT film during the dewetting process due to directional retraction of vapor-liquid interfaces. Compared to the previous studies based on *ex situ* observations of dried samples, our *in situ* observation successfully captured temporal evolution of the dewetting-induced deformation, which represents initial stages of capillary processes that lead to the self-organization of VA-SWCNTs reported in recent literatures.

[1]JSPS KAKENHI Grant Numbers JP15H05760 and JP18H05329

Yuta Yoshimoto
Department of Mechanical Engineering, The University of Tokyo

Date submitted: 30 Jul 2019 Electronic form version 1.4