

Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

Novel humidity responsive film fabricated by hydrophilic nanostructured titanium oxide¹ MINKI LEE, GYUHYEON HAN, JINKEE LEE, School of Mechanical Engineering, Sungkyunkwan University — We fabricated a humidity responsive film comprising a bundle of titanium oxide tubes that changes film's curvature corresponding to the relative humidity. The mechanism of the change in curvature of the film can be explained by adsorption, condensation, and evaporation of water molecules within the surface of film. During adsorption, a liquid bridge forms because of growth of a water layer between tubes, thus contracting the gap between tubes. When vapor pressure exceeds the equilibrium vapor pressure, condensation occurs at the meniscus of the liquid bridge, thus expanding the gap between tubes. We obtained the adsorption and desorption isotherms for the humidity responsive film by measuring physical adsorption. Additionally, we demonstrated varying motions of the humidity responsive film when a water droplet was applied on the surface. The film could distinguish between saturated and over-saturated humidity conditions, such as fog and rain, respectively. Therefore, this humidity responsive film can be applied to environmental monitoring systems and possibly even to energy harvesting systems.

¹This research was supported by KEITI (2019002790003) and IPET (Grant No. 118094-03).

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Date submitted: 26 Jul 2019

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