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Unexpected Suppression of Leidenfrost Phenomenon on Superhydrophobic Surfaces MENG SHI, RATUL DAS, SANKARA ARUNACHALAM, HIMANSHU MISHRA, King Abdullah University of Science and Technology — The Leidenfrost phenomenon ascribes to a non-equilibrium situation, wherein a liquid droplet levitates above a superheated surface. Superhydrophobic surfaces are believed to dramatically reduce water's Leidenfrost point (LFP - the temperature when the Leidenfrost phenomenon occurs), even approaching its boiling point in some cases. The causation is that superhydrophobic surfaces robustly entrap air when brought in contact with water, which reduce the contact area and adhesion between the droplet and the surface, and thus promote the formation of the vapor layer on heating. Here, we report on a curious exception. Using high-speed imaging, we investigated water droplets placed on hot superhydrophobic SiO2/Si surfaces adorned with arrays of doubly reentrant pillars (DRPs). We found the LFP for water droplets on SiO2/Si DRPs could be significantly higher than that smooth SiO2/Si surfaces, even though the former exhibits superhydrophobicity and the latter is hydrophilic. Thus, we advance the notion that superhydrophobic surfaces may not always lower the LFP of water. We will present deeper insights into our observations based on complementary experiments and theory.

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