

Center for Soft Matter and Biological Physics

Discussion Meeting

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“Fun with Water: Catching Fog, Building Trees, and Freezing Bubbles”

Date/Time: Friday, 03 May 2019, 4:00pm-5:00pm

Location: 304 Robeson Hall

Abstract: Nature displays incredible feats of fluid mechanics that have much to teach us. Here, we study and exploit four different kinds of nature-inspired fluid phenomena: two involving liquid-phase behavior and two involving freezing water. First, we'll explain how coastal redwoods have inspired a “fog harp” that harvests several times more water than existing fog harvesters. Second, we demonstrate that synthetic trees are capable of passively pumping water against gravity on the same scale as natural trees. The beauty of freezing bubbles is explained by novel physical models. Finally, we show that simple scaling laws can rationalize the development of passive anti-frosting surfaces.



Figure 1: Lessons from nature: (a) Redwood-inspired fog harp, (b) Mangrove-inspired synthetic tree, (c) Freezing bubbles, and (d) Cloud-inspired anti-frosting surface.



Jonathan Boreyko is an Assistant Professor at Virginia Tech in the Department of Mechanical Engineering. Dr. Boreyko received his Ph.D. in Mechanical Engineering and Materials Science from Duke University followed by a postdoc at the Oak Ridge National Laboratory. His research lies at the intersection of fluid mechanics, phase-change heat transfer, and materials science and has been covered by *The New York Times*, *The Washington Post*, *Science Magazine*, *NPR*, and *Discovery Channel Canada*. He has published 40 papers and 3 patents which have been cited over 2,000 times to date. Recent awards won by Dr. Boreyko include the National Science Foundation's CAREER Award, the Air Force Young Investigator Program (YIP) Award, and the 2017 Dean's Award for Outstanding New Assistant Professor.