Abstract Submitted
for the DFD20 Meeting of
The American Physical Society

Surface morphology and flow dynamics in biomimetic wind-driven fog harvesting AIDA SHAHROKHIAN, University of Akron, FAN KIAT CHAN, MATTIA GAZZOLA, University of Illinois at Urbana-Champaign, HUNTER KING, University of Akron — The physical and behavioral adaptations evolved through eons by plants and animals can provide practical solutions to enhance the efficacy of the current technologies. Using fog as a source of fresh water has been observed in a few species of the Namib desert beetles. One of these species, O.unguicularis, climbs to the top of the sand dunes on foggy days and uses its own body to collide with the inertial drops carried by the wind. The influence of the surface wettability on transportation of the already deposited drops has been extensively studied. However, the interplay between surface morphology and fluid dynamics that can enhance impaction of the fog drops is not fully understood. Careful experiments complimented by numerical flow simulations show that surface morphology governs deposition efficiency and inherent effect of lubrication forces can be manipulated by surface texture and mechanics. Altering drops motion and inducing collisions with minimal geometrical modifications can offer design guidelines for enhanced fog collectors and can be a possible driver of the physical adaptation of O.unguicularis.

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Date submitted: 10 Aug 2020 Electronic form version 1.4