Micro/Nano Surface and Particle Grasping

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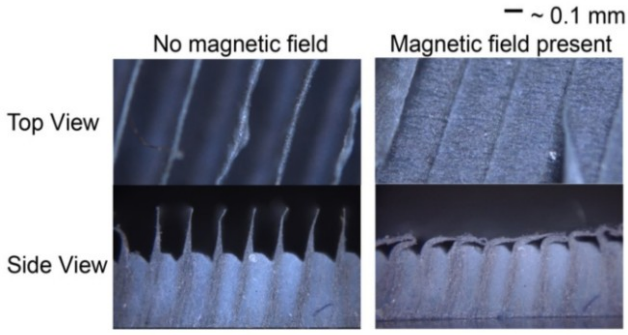
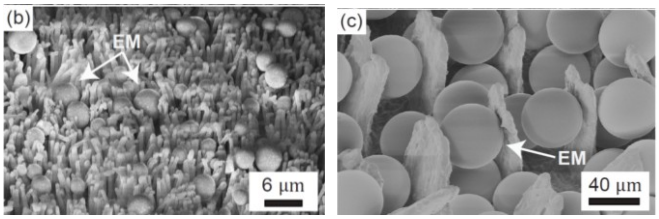
Abstract

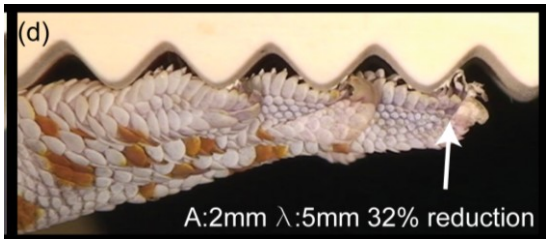
Control of robot grasping of surfaces is important for both increasing friction to avoid slip, increasing adhesion to allow wall-climbing robots, and to controllably grasp and release microparticles. Arrays of hard polymer microfibers can be fabricated by molding, providing on the order of 100 million passive nanofingers per square centimeter. Through control of nanofiber geometry under specific loading conditions, directional adhesive surfaces can be demonstrated which easily attach and release. These arrays can adhere, yet self-clean due to modulation of adhesion.



a) Magnetically controllable adhesive surface.



b,c) Particle capture by surfaces



d) Gecko lamella structure for rough surfaces

Biography

Ronald Fearing is a professor in the Dept. of Electrical Engineering and Computer Sciences at Univ. of California, Berkeley, which he joined in Jan. 1988. His current research interests are in bioinpired millirobots, including flying and running micro-robots, parallel nanograsping (gecko adhesion), and rapid prototyping. He has previously worked in tactile sensing, teletaction, and dextrous manipulation. He has a PhD from Stanford in EE (1988) and SB and SM in EECS from MIT (1983). He received the Presidential Young Investigator Award in 1991, and is the co-inventor on 16 US and international patents.

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