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Title:	Microscopic modulation of mechanical properties in transparent insect wings
Authors:	Arora, Ashima (/jspui/browse?type=author&value=Arora%2C+Ashima) Kumar, Pramod (/jspui/browse?type=author&value=Kumar%2C+Pramod) Bhagavathi, Jithin (/jspui/browse?type=author&value=Bhagavathi%2C+Jithin) Singh, K.P. (/jspui/browse?type=author&value=Singh%2C+K.P.) Sheet, G. (/jspui/browse?type=author&value=Sheet%2C+G.)
Keywords:	Microscope cantilever Quasi-periodic Topographic
Issue Date:	2014
Publisher:	American Institute of Physics
Citation:	Applied Physics Letters, 104(6)
Abstract:	We report on the measurement of local friction and adhesion of transparent insect wings using an atomic force microscope cantilever down to nanometre length scales. We observe that the wing-surface is decorated with 10 μm long and 2 μm wide islands that have higher topographic height. The friction on the islands is two orders of magnitude higher than the back-ground while the adhesion on the islands is smaller. Furthermore, the high islands are decorated with ordered nano-wire-like structures while the background is full of randomly distributed granular nano-particles. Coherent optical diffraction through the wings produce a stable diffraction pattern revealing a quasi-periodic organization of the high islands over the entire wing. This suggests a long-range order in the modulation of friction and adhesion which is directly correlated with the topography. The measurements unravel novel functional design of complex wing surface and could find application in miniature biomimetic devices.
URI:	https://aip.scitation.org/doi/10.1063/1.4865202 (https://aip.scitation.org/doi/10.1063/1.4865202) http://hdl.handle.net/123456789/2794 (http://hdl.handle.net/123456789/2794)
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