Success story from the SPM lab

Nano-meter scale modulation of mechanical properties of transparent insect wings revealed by atomic force microscopy

The ability of tiny insects to survive in extreme environmental conditions is remarkable[1-2]. The wings are known to possess extraordinary hydrophobic and self-cleaning properties which are result of superior natural engineering at the nanometer length scales[3]. It is believed that the nanometer scale architecture of such wings might give adequate guidance in constructing novel artificial bio-mimetic synthetic surfaces resistant to dust and water. Novel design ideas might be obtained through the investigation of the nanometer scale topographic and mechanical properties of such insect wings[4]. In this project we measured the frictional and adhesive properties of transparent insect wings at the nanometer length scales using a multi-mode atomic force microscope (AFM) [5]. We observed that the friction and adhesive properties are spatially modulated and this modulation is directly correlated to the topographic modulation of the wing-surface. We have explained the structural origin of this modulation through high resolution AFM imaging and mathematical modelling.

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