Functional surfaces for pick-and-drop devices controlled by light

Initiative: Integration molekularer Komponenten in funktionale makroskopische Systeme (beendet, nur noch

Fortsetzungsanträge)

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The amazing abilities of animals like geckos, spiders or beetles which can stick vertical or upside down walking has been subject of many scientific research studies over last decades. Many biological systems have attachment devices that ensure substantial adhesion, and also allow quick detachment. For example, geckos have fibrillar setae which branch out into nano-structures. This fibrillar hierarchical structure has a non-sticky default state which can be switched to adhesive state through force load by gross leg movements. Inspired from such stimuli-responsive adhesive systems in nature, artificial switchable adhesive micro/nano-structures have been produced. As a candidate for such a stimulus, light can induce macroscopic geometry changes of artificial adhesives. The main aim of this project is to develop smart adhesive surfaces, with dynamic properties that are controlled by light. These light responsive adhesives can display macroscopic functions through e.g. sunlight and enable applications like light-driven robots and photocontrollable pick-and-drop structures instead of high energy consuming devices. Our strategy involves the re-engineering of physical principles that have been optimized by evolution, by using modern fabrication techniques (photolithography & 3D printing) and materials (liquid crystal elastomers).

Projektbeteiligte

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