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Antifouling Surfaces: Removal of Micro-Particles by Magnetic Artificial Cilia

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MOTIVATION

The fouling of surfaces submerged in a liquid is an important problem for many applications. One biologically inspired strategy to tackle this problem is given by *cilia-induced particle transportation and cleaning*. Biological cilia are micro-hairs, which have been reported to have such functions as fluid propulsion, feeding, mucus removal out of the human airway, transport of microscopic particles, etc. Here, for the first time, we experimentally prove that magnetic artificial cilia (MAC) are able to remove micro-particles from the ciliated area.

EXPERIMENTS

The fouling of surfaces submerged in a liquid is an important problem for many applications. One biologically inspired strategy to tackle this problem is given by *cilia-induced particle transportation and cleaning*. Biological cilia are micro-hairs, which have been reported to have such functions as fluid propulsion, feeding, mucus removal out of the human airway, transport of microscopic particles, etc. Here, for the first time, we experimentally prove that magnetic artificial cilia (MAC) are able to remove micro-particles from the ciliated area.

RESULTS

Micro-molded magnetic artificial cilia are able to remove the vast majority of a large size range (30 to 500 μm) of micro-particles from their vicinity within a minute, creating a clean area. This finding offers a new method to manipulate micro-particles and to create a novel type of self-cleaning/antifouling surface, which can find applications in, for example, marine antifouling and lab-on-a-chip devices.

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