Dr. Anna Balazs’ Work Featured on the Cover of *Journal of Physical Chemistry Letters*

The research work of McGowan Institute for Regenerative Medicine affiliated faculty member Anna Balazs, PhD, Distinguished Professor of Chemical Engineering and the Robert v. d. Luft Professor, Department of Chemical & Petroleum Engineering, University of Pittsburgh, was featured on the May 15, 2014, edition cover of the *Journal of Physical Chemistry Letters*. The cover art corresponds to her paper entitled “Designing Bioinspired Artificial Cilia to Regulate Particle-Surface Interactions.”

The paper’s abstract reads:

> Biological cilia play a critical role in a stunning array of vital functions, from enabling marine organisms to trap food and expel fouling agents to facilitating the effective transport of egg cells in mammals. Inspired by the performance of these microscopic, hair-like filaments, researchers are synthesizing artificial cilia for use in lab-on-a-chip devices. There have, however, been few attempts to harness the artificial cilia to regulate the movement of particulates in these devices. Here, we review recent computational studies on the interactions between actuated artificial cilia and microscopic particles, showing that these cilia are effective at transporting both rigid and deformable particles in microchannels. The findings also reveal that these beating filaments can be used to separate microparticles based on their size and stiffness. Importantly, these studies indicate that artificial cilia can be used to prevent fouling by a wide variety of agents because they can expel both passive particulates and active swimmers from the underlying surface. These results can help guide experimental efforts to fully exploit artificial cilia in controlling particle motion within fluid environments.

The research interests of Dr. Balazs center on statistical, mechanical, and computer modeling of complex chemical systems and developing theories for the properties of polymer blends and the behavior of polymers at surfaces and interfaces.

Specifically, ongoing projects involve:

- Predicting the phase behavior of polymer/clay nanocomposites
- Determining the kinetic behavior of binary mixtures containing solid particles
- Designing polymeric inhibitors to prevent cell-virus contact
- Tailoring the interactions between polymer-coated colloids
- Promoting adhesion at polymeric interfaces
- Designing patterned polymer films
• Investigating the tribological behavior of polymer interfaces

Illustration: *Journal of Physical Chemistry Letters.*

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