

MAR17-2016-020723

Abstract for an Invited Paper  
for the MAR17 Meeting of  
the American Physical Society

**Does Prescribed Randomness Hold the Key to Interface Synthetic and Natural Systems?<sup>1</sup>**

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The bottlenecks to engineering biomimetic functional materials are not only to duplicate hierarchical structures, but also to manipulate the system dynamics. Bio-inspired responsive materials have been investigated extensively within the past few decades with much success. Yet, the level of control of these complex systems is still rather simplistic. More importantly, we have yet to uncover the design rules to synergize natural and synthetic building blocks that allows us to go beyond just a few specific families of natural building blocks. I am going to discuss our recent studies that demonstrated the feasibility to develop synthetic protein-like polymers that can interface with natural proteins and biomachinaries. Rational design of these protein-like polymers thus opens a viable approach toward functional materials based on natural components.

<sup>1</sup>The work is supported by DOD-ARO W911NF-16-1-0405