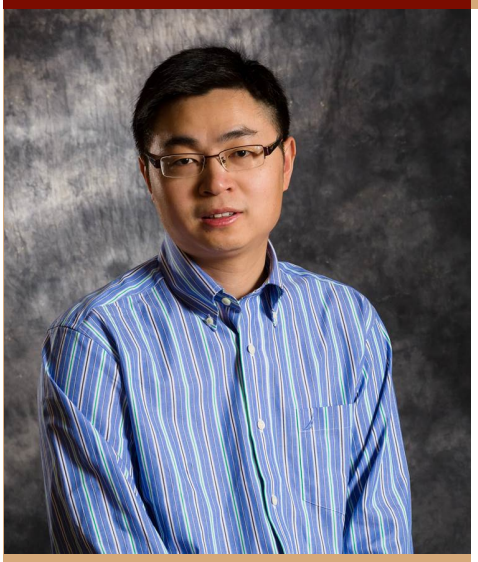
Jan 16, 2014

Flexible, Adaptive Camouflage Skins Using Concepts Inspired by Cephalopods



Cunjiang Yu

Assistant Professor

Department of Mechanical Engineering

University of Houston

Abstract: Nature gives lots of examples of camouflaging and displaying. Among a variety of specific species, cephalopods, such as squid and cuttlefish, have amazing dynamic control over their appearances such as color, contrast and patterns, for the purposes of disguising, protection, or warning. These capabilities have been envisioned to have profound applications in many fields. So far, the capabilities have not been duplicated by synthetic systems. Here, we have achieved fully functional, bio-inspired flexible color changeable cephalopod skins through the engineering of materials, mechanics, and manufacturing. These flexible skins enclose electronics, photodetectors and color-changing materials, and can automatically adapt to an entrance of their environment, much like the skin of cuttlefish and squid. This prototype device is capable of producing black-and-white patterns that match those of the surroundings, in an automated fashion without any direct manual control. The strategy of integrating conventional wafer-based ultra-thin semiconductor electronics with flexible and soft substrates by transfer printing is critical to the realization of this complex, multifunctional flexible electronics system.

Biography: Cunjiang Yu is an Assistant Professor of Mechanical Engineering at the University of Houston. He received B.S. and M.S. degrees in Mechanical Engineering and Electrical Engineering in 2004 and 2007, respectively, from Southeast University, Nanjing, China. And he received his Ph.D. in Mechanical Engineering at Arizona State University in 2010. He got trained as a postdoc at the University of Illinois at Urbana-Champaign before he joined UH. His research interests include flexible and stretchable electronics, MEMS, multi-scale manufacturing, energy harvesting and storage, etc.