Stuck On Sustainability

Jonathan Wilker

Professor, Chemistry and School of Materials Engineering (by courtesy)

CURRENT RESEARCH

Sea-life inspired adhesives improve patient outcomes and environmental sustainability

Visit a rocky beach during low tide and you will see mussels, oysters, barnacles, sea grasses, anemones, starfish, and limpets all attached to rocks. How do they do that when none of the existing adhesives at the hardware store can stick when wet? Dr. Jonathan Wilker, of Purdue University, is working to understand how marine biology makes materials such as these wet-setting glues. By understanding how sea creatures work, Dr. Wilker and his team are developing new synthetic adhesives with biomedical applications to replace sutures and screws. They are also designing coatings to prevent biological adhesion on ship hulls, to decrease drag and the 3.5% of all fossil fuel use consumed by international shipping. Dr. Wilker has been working for 15 years to understand and mimic biological adhesion. Thus far, he has gained some key insights to explain how shellfish stick. His best performing material is capable of bonding more strongly than commercial "Super Glue" which is especially exciting given the additional property of being able to bond when underwater.

Dr. Wilker hopes to apply his adhesive for replacing sutures, staples, and screws used during surgery. Patient outcomes will then improve, once we can avoid the damage created by such current surgical joinery methods. In addition to biomedical applications, Dr. Wilker's research aims to find more sustainable ways to prevent sea life from sticking to the bottom of boats. Currently, the ships are covered with red antifouling paints which prevent sea life from bonding. The problem here is that antifouling coatings release toxic copper and prevent biological adhesion by killing everything in the water around a ship. By better understanding the key aspects of...

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AFFILIATION

Purdue University

EDUCATION

- Postdoctoral Scholar in Division of Chemistry and Chemical Engineering 1999,California Institute of Technology
- Ph.D. in Department of Chemistry 1996,Massachusetts Institute of Technology
- B.S. in Department of Chemistry 1991,University of Massachusetts, Amherst, MA

AWARDS

- PopTech Science Fellow, 2013
- The College of Science Outstanding Teacher Award, Purdue University, 2011
- Alfred P. Sloan Foundation Research Fellow, 2002
- Arnold and Mabel Beckman Foundation Young Investigator Award, 2001
- National Science Foundation Faculty Early Career Development Award (CAREER), 2001

RESEARCH AREAS

Life Science, Health IT, Oceanic

FUNDING REQUEST

Your contributions will support the continued research of Dr. Jonathan Wilker, of Purdue University, as he uses nature's ocean life to inspire applications that will affect people and our environment. Your donations will support the necessary $70K per year required for each graduate student and their supplies. In choosing to support his research, you will play a part in protecting the oceans while also allowing the seas to better protect human life!