Massachusetts Institute of Technology

Angela Belcher is a biological and materials engineer with expertise in the fields of biomaterials, biomolecular materials, organic-inorganic interfaces and solid-state chemistry and devices. Her primary research focus is on developing new materials for energy, electronics, the environment, and medicine. She received her B.S. in Creative Studies with an emphasis on biology from The University of California, Santa Barbara. She earned a Ph.D. in inorganic chemistry at UCSB in 1997. Following her postdoctoral research in electrical engineering at UCSB, she joined the faculty at The University of Texas at Austin in the Department of Chemistry in 1999. She joined the faculty at MIT in 2002. Some recent awards include the 2013 $500,000 Lemelson-MIT Prize for her Inventions, 2010 Eni Prize for Renewable and Non-conventional Energy, in 2009 Rolling Stone Magazine listed her as one of the top 100 people changing the country.

3M Lecturers

1962	**Sir Derek H. R. Barton, Imperial College**
1963	Sir Ronald Nyholm, University College
1964	F. C. Tompkins, Imperial College
1965	S. Winstein, U.C.L.A.
1966	F. A. Cotton, M.I.T.
1967	J. O. Hirschfelder, Wisconsin
1968	A. Eschenmoser, E.T.H., Switzerland
1969	**H. Taube, Stanford**
1970	S. A. Rice, Chicago
1971	F. H. Westheimer, Harvard
1972	R. G. Pearson, Northwestern
1973	W. A. Klemperer, Harvard
1974	G. Stork, Columbia
1975	R. J. P. Williams, Oxford
1976	J. A. Morrison, McMaster
1977	D. Arigoni, E.T.H., Switzerland
1978	J. Chatt, Sussex
1979	**J. A. Pople, Carnegie-Mellon**
1980	W. P. Jencks, Brandeis
1981	J. Halpern, Chicago
1982	Sir John Meurig Thomas, Cambridge
1983	R. Breslow, Columbia
1984	M. L. H. Green, Oxford
1985	**D. R. Hershbach, Harward**
1986	**J. M. Lehn, Strasbourg**
1987	M. H. Chisholm, Indiana
1988	**R. A. Marcus, Cal. Tech.**
1989	**D. J. Cram, U.C.L.A.**
1990	D. Seyferth, M.I.T.
1991	D. A. Shirley, Berkeley
1992	K. U. Ingold, NRC
1993	H. Schmidbauer, Munich
1994	A. J. Bard, U. Texas, Austin
1996	R. Huisgen, Munich
1998	J. M. J. Fréchet, Berkely
1999	R. W. Field, M.I.T.
2000	I. Dance, New South Wales
2001	K. C. Nicolaou, San Diego
2002	R. R. Birge, Connecticut/Syracuse
2003	D. Fenske, Karlsruhe
2004	A. Padwa, Emory
2005	N. Dovichi, Washington State
2006	K. N. Raymond, Berkeley
2007	K. Tamao, RIKEN and Kyoto University
2008	P. Corkum, NRC, Ottawa
2009	D. Astruc, Univ. Bordeaux
2010	Harry B. Gray, Cal. Tech.
2013	Ian Manners, Bristol, UK
2015	Angela Belcher, M.I.T.

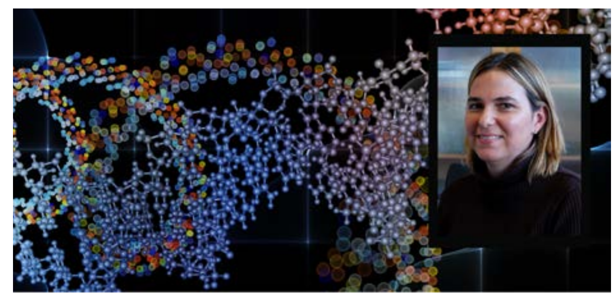
3M Western

The 3M University Lecturer in Chemistry 2015

Angela Belcher

Massachusetts Institute of Technology (M.I.T.)

Cambridge, MA, United States



https://be.mit.edu/directory/angela-belcher

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smommers@uwo.ca

Chemistry Website: http://www.uwo.ca/chem/

Monday, September 21, 2015
3:30 p.m.
London Health Sciences Centre
University Hospital, Auditorium A

REFRESHMENTS WILL BE SERVED PRIOR TO THE LECTURE

Lecture 1

Giving New Life to Materials for Energy, the Environment and Medicine

Organisms have been making exquisite inorganic materials for over 500 million years. Although these materials have many desired physical properties such as strength, regularity, and environmentally benign processing, the types of materials that organisms have evolved to work with are limited. However, there are many properties of living systems that could be potentially harnessed by researchers to make advanced technologies that are smarter, more adaptable, and that are synthesized to be compatible with the environment. One approach to designing future technologies which have some of the properties that living organisms use so well, is to evolve organisms to work with a more diverse set of building blocks. The goal is to have a DNA sequence that codes for the synthesis and assembly of any inorganic material or device. We have been successful in using evolutionarily selected peptides to control physical properties of nanocrystals and subsequently use molecular recognition and self-assembly to design biological hybrid multidimensional materials. These materials could be designed to address many scientific and technological problems in electronics, military, medicine, and energy applications. Currently we are using this technology to design new methods for building batteries, fuel cells, solar cells, carbon sequestration and storage, enhanced oil recovery, catalysis, and medical diagnostics and imaging. This talk will address conditions under which organisms first evolved to make materials and scientific approaches to move beyond naturally evolved materials to genetically imprint advanced technologies with examples in lithium ion batteries, lithium-air batteries, dye-sensitized solar cells, and ovarian cancer imaging.

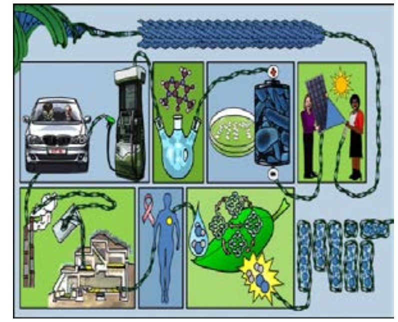
Tuesday, September 22, 2015
1:00 p.m.
London Health Sciences Centre
University Hospital, Auditorium B

REFRESHMENTS WILL BE SERVED PRIOR TO THE LECTURE

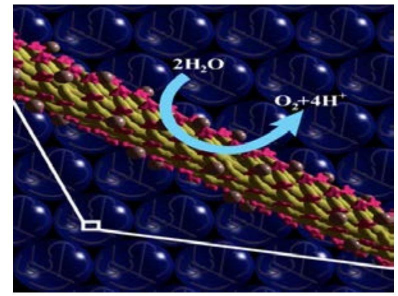
Lecture 2

Understanding and Using Nature's Design to Develop Materials for Applications in Energy and Deep Imaging of Cancer

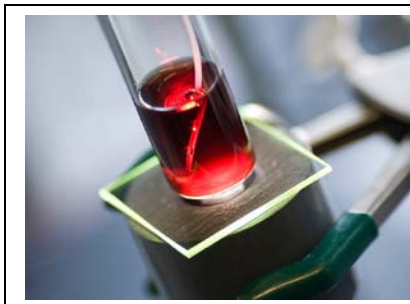
Nature has evolved the ability to grow many exquisite inorganic nanomaterials. The construction of these nanomaterials is coded at the genetic level. For example, abalone shells grow calcium carbonate based materials using proteins that control crystal composition, structure and size. The goal of the research in the Belcher Lab has been to understand the processes by which nature makes inorganic materials and to apply similar processes for construction of technologically important materials on the nanoscale. Our approach has been to look for proteins that can control the growth of inorganic materials and at the same time have a genetic link to the growth and assembly of these materials. To accomplish this, the Belcher Lab has utilized the M13 bacteriophage as a genetic tool to isolate proteins that can grow and assemble a wide range of materials for device applications in energy, the environment and medicine. This talk will address many of the technologies that the Belcher Lab has developed with a focus on materials for both energy applications and imaged guided surgery for ovarian cancer.



Lecture 1



Lecture 2



Chemistry