



## **ICFO Colloquium ADAM E. COHEN 'Bringing Bioelectricity to Light'**

ADAM E. COHEN

May 08, 2015

---

Friday, May 8th, 12:00, ICFO's Auditorium

### **ADAM E. COHEN**

Professor in the departments of Chemistry and Chemical Biology and Physics at Harvard, with additional appointments in the Center for Brain Science and the Harvard Stem Cell Institute. He is also an investigator with the Howard Hughes Medical Institute. His research focuses on understanding and controlling light-matter interactions in warm, wet, squishy environments. Projects in the Cohen Lab range from new approaches to imaging brain function, to understanding fundamental quantum mechanics of light-matter interactions, to studies on the biophysics of mucus.

Cohen obtained PhD degrees from Stanford in experimental biophysics (2007) and

Cambridge, UK in theoretical physics (2003). He was an undergraduate at Harvard where he graduated summa cum laude in 2001. He attended Hunter College High School in New York City.

In 2007 Technology Review Magazine named Cohen one of the top 35 US technological innovators under the age of 35 and in 2012 Popular Science named him one of their "Brilliant Ten" top young scientists. In 2014 Cohen received the Blavatnik National Award in Chemistry and the American Chemical Society Pure Chemistry Award. He has published over fifty peer-reviewed publications and has five patents issued or pending.

In addition to his academic work, Cohen has founded a biotech company, Q-State Biosciences, focused on combining optical imaging with stem cell technology to develop new diagnostics and therapies for neuropsychiatric and neurodegenerative diseases. He has also traveled to Liberia where he worked on strengthening science education at the University of Liberia.

In the wild, microbial rhodopsin proteins convert sunlight into biochemical signals in their host organisms. Some microbial rhodopsins convert sunlight into changes in membrane voltage. We engineered a microbial rhodopsin to run in reverse: to convert changes in membrane voltage into fluorescence signals that are readily detected in a microscope. Archaerhodopsin-derived voltage-indicating proteins enable optical mapping of bioelectric phenomena with unprecedented speed and sensitivity. We are applying these tools to study the role of voltage across biology: in bacteria, plant roots, fish hearts, mouse brains, and human induced pluripotent stem cell (hiPSC)-derived neurons and cardiomyocytes. We are engineering new functionality into microbial rhodopsins by taking advantage of their strong optical nonlinearities.

**Friday, May 8th, 12:00, ICFO's Auditorium**