

# Dr. Aihua Xie

Department of Physics

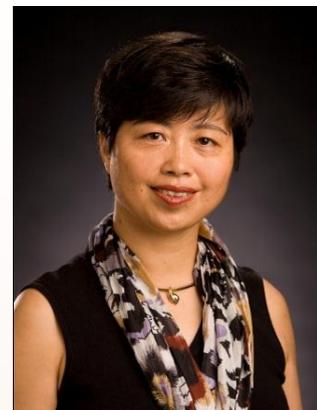
Dr. Aihua specializes in protein biophysics. She was a visiting scientist at the University of California in San Francisco from 1984 to 1986, and earned her Ph.D. in physics and in biophysics from Carnegie Mellon University in 1987. After postdoctoral research and a visiting assistant professorship in physics at the University of Illinois at Urbana-Champaign, she moved to Albert Einstein College of Medicine in New York as research faculty in biophysics and was associate director of the Regional Center for Time-resolved Synchrotron Spectroscopy. Xie joined Oklahoma State University as assistant professor of physics in 1997, and has been a professor of physics since 2006. She was honored as recipient of a Junior Faculty Award for Scholarly Excellence from OSU in 2000 and has been a fellow of the American Physical Society since 2003. Xie leads the Division of Biological Physics of the American Physical Society as Chair-Elect in 2010 and will lead as Chair in 2011.

Xie's research interest is centered on proteins, molecular workers that carry out most of the biological functions in cells. Thousands to tens of thousands of different proteins are found in individual cells. Some proteins tell cells when to grow, when to divide, when to stop growing, and when to die. These proteins are part of complex signaling network that controls the intricate balance and order among cell functions. Damages to cell signaling systems cause many devastating diseases, such as cancer and Alzheimer's disease.

A major challenge to unravel the working principles of proteins is how to watch tiny proteins perform their functions. The functionally important structural motions of proteins are 1,000 times smaller than the detection limit of the best optical microscopes. On top of their minute size, proteins move incredibly fast, from one millionth of a second (millisecond) to one trillionth of a second (picosecond). The Xie lab is pioneering the development of infrared structural biology that will be able to detect functionally important structural motions from picoseconds to seconds and as small as the movement of protons.

The Xie lab is also devoted to the exploration and discovery of unifying principles of proteins. Specific topics of research include: the mechanism of receptor activation in biological signaling, the mechanism of proton transfer in signaling, catalysis, bioenergetics, and the impact of salts on protein structure and dynamics.

In collaboration with Dr. Wouter Hoff's lab, Xie and her team also develop novel biosensor technology based on optical proteins, protein engineering, microfluidics and fluorescence. One major application is rapid detection of life threatening microbes to counter bio-terror attack. Another major application is to improve medical diagnosis of diseases.



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