



Xiaowei Zhuang

Harvard University

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Xiaowei Zhuang is the David B. Arnold Professor of Science at Harvard University and an investigator of Howard Hughes Medical Institute. Her laboratory has developed single-molecule, super-resolution and genomic-scale imaging methods, including STORM and MERFISH, and has used these methods to discover novel molecular structures in cells and cell organizations in tissues.

Zhuang received her BS in physics from the University of Science and Technology of China, her PhD in physics in the lab of Prof. Y. R. Shen at University of California, Berkeley, and her postdoctoral training in biophysics in the lab of Prof. Steven Chu at Stanford University. She joined the faculty of Harvard University in 2001 and became a Howard Hughes Medical Institute investigator in 2005.

Zhuang is a member of the US National Academy of Sciences and the American Academy of Arts and Sciences, a foreign member of the Chinese Academy of Sciences and the European Molecular Biology Organization, a fellow of the American Association of the Advancement of Science and the American Physical Society. She received honorary doctorate degrees from the Stockholm University in Sweden and the Delft University of Technology in the Netherlands. She has received a number of awards, including the Breakthrough Prize in Life Sciences, National Academy of Sciences Award in Scientific Discovery, Dr. H.P. Heineken Prize for Biochemistry and Biophysics, National Academy of Sciences Award in Molecular Biology, Raymond and Beverly Sackler International Prize in Biophysics, Max Delbrück Prize in Biological Physics, American Chemical Society Pure Chemistry Award, MacArthur Fellowship, etc.

Abstract: Imaging at the Genomic-Scale: From 3D Organization of the Genomic DNA to Cell Atlas of Complex Tissues

Inside a cell, thousands of different genes function collectively to give rise to cellular behavior. Understanding the behaviors and function of cells require imaging at the genomic scale, which promises to transform our understanding in many areas of biology, such as regulation of gene expression, development of cell fate, and organization of distinct cell types in complex tissues. We developed a genomic-scale imaging method, multiplexed error-robust fluorescent in situ hybridization (MERFISH), which allows simultaneous imaging of RNAs from hundreds to thousands of genes in individual cells and facilitates the delineation of gene regulatory networks, the mapping of molecular distributions inside cells, and the mapping of distinct cell types in complex tissues. We have also extended multiplexed FISH approach to image numerous genomic loci and trace the 3D structure of chromosomes in single cells. I will describe the technology development of MERFISH and its applications focusing on generating the cell atlas of complex tissues and mapping the 3D organization of genomic DNA in cells.