

par **Gang (Gary) REN**
Lawrence Berkeley National Laboratory, USA
The Molecular Foundry

Individual-particle electron tomography (IPET): an approach to reveal protein dynamics

Cellular activity is often occurred by macromolecule in action, in which the molecules adopt with multiple conformations, including highly dynamic states and excited transition intermediates for enzymatic catalysis, signaling regulation and protein–protein interactions. The understanding of the macromolecular function requires the characterization of the structure and dynamics. Unfortunately, macromolecule with large-scale conformational changes and dynamics is generally challenging for structure determination via any averaging approaches. In the past decade, we developed an approach, so-called individual-particle electron tomography (IPET) to achieve 3D structure of a single-molecule (without averaging) at low to intermediate resolution. Through the structure determination of each individual particle of the molecule via flexible fitting the structure model into each IPET 3D density maps, the comparison of those structures provides a new opportunity to characterize the molecular thermodynamic, machinery, and even structural changes in proteins during a chemical reaction.

Reference

- Single-Molecule 3D Imaging of Human Plasma Intermediate-Density Lipoproteins Reveals a Polyhedral Structure, Dongsheng Lei, Yadong Yu, Yu-Lin Kuang, Jianfang Liu, Ronald M. Krauss, Gang Ren, *BBA Molecular and Cell Biology of Lipids*, (2019), 1864(3):260-270
- 3D Structural Dynamics of DNA Origami Mechanisms and Machines Using Individual-Particle Electron Tomography, Dongsheng Lei, Alex Marras, Jianfang Liu, Chaomin Huang, Lifeng Zhou, Carlos Castro, Hai-Jun Su, Gang Ren, *Nature Communications*, (2018), 9:592, DOI: 10.1038/s41467-018-03018-0
- 3D Structural Dynamics and Fluctuations of DNA-Nanogold Conjugates by Individual-Particle Electron Tomography, Lei Zhang, Dongsheng Lei, Jessica M. Smith, Huimin Tong, Xing Zhang, Zhuoyang Lu, Paul Alivisatos and Gang Ren, *Nature Communications*, (2016), 7:11083. doi: 10.1038

Hôte : Wai Li Ling (IBS/groupe Microscopie Electronique et Méthodes)