

An Instagram View of the Nanoworld

¹Deborah F. Kelly, Ph.D.

¹Department of Biomedical Engineering; Center for Structural Oncology, Pennsylvania State University, University Park PA 16802, USA

Biomedical research improves our understanding of human health and disease through the development of new technologies. High-resolution imaging is one technology that is transforming our view of the nanoworld – permitting us to study cells and molecules in exquisite detail. Structural information of dynamic components, however, reveals only an instant of their complex narrative.

Recent advances in the production of materials such as graphene and silicon nitride provide new opportunities for EM imaging in real-time. We use these materials to create environmental chambers and perform experiments *in situ*, or “inside”, the EM column. Together, with microfluidic technology, we can now view biological processes in a native liquid environment at the nanoscale (**Fig. 1a**). Other recent applications of *in situ* imaging include real-time recordings of nanoparticle therapies interacting with cancer stem cells and changes in the molecular intricacies of viral pathogens. These results complement our ongoing cryo-EM studies on tumor suppressor proteins (**Fig. 1b, c**) as we strive to analyze molecular events with high spatial and temporal resolution.

Acknowledgements: This work was supported by funding from the National Institutes of Health and the National Cancer Institute [R01CA193578, R01CA227261, and R01CA219700 to D.F.K.].

