

Towards quantitative protein separations: Imaging protein dynamics at nanoscale interfaces



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LECTURE ABSTRACT

Recent efforts by our group and others have shown the promise of applying single molecule methods to link mechanistic detail about protein adsorption to macroscale observables. When we study one molecule at a time, we eliminate ensemble averaging, thereby accessing underlying heterogeneity. However, we must develop new methods to increase information content in the resulting low density and low signal-to-noise data and to improve space and time resolution.

I will highlight recent advances in super-resolution microscopy for quantifying the physics and chemistry that occur between target proteins and stationary phase supports during chromatographic separations. My discussion will concentrate on the newfound ability of super-resolved single protein spectroscopy to inform theoretical parameters via quantification of adsorption-desorption dynamics, protein unfolding, and nano-confined transport. Additionally, I will discuss using phase manipulation to encode temporal and 3D spatial information, and the opportunities and challenges associated with such imaging methods.

SPEAKER BIOSKETCH

Christy F. Landes is a professor in the Department of Chemistry at Rice University in Houston, TX, with appointments in the Departments of Electrical and Computer Engineering, and Chemical and Biomolecular Engineering. After graduating with a BS from George Mason University in 1998, she completed a Ph.D. in Physical Chemistry at the Georgia Institute of Technology in 2003 under the direction of Prof. Mostafa El-Sayed. She was a postdoctoral researcher at the University of Oregon and an NIH postdoctoral fellow at the University of Texas at Austin, under the direction of Prof. Geraldine Richmond and Prof. Paul Barbara, respectively, before joining the University of Houston as an assistant professor in 2006. She moved to her current position at Rice in 2009. Christy is an active member of the American Chemical Society and the Physical Chemistry Division, and will serve as Vice-Chair Elect, Vice-Chair, Chair-Elect and Chair of the Division from 2020-2023. One of her interests is in bringing scientists together to form communities that span different areas of expertise. She has organized national, regional, and local symposia. She serves as a senior editor of the *Journal of Physical Chemistry Letters*, on the Editorial Committee of the *Annual Review of Physical Chemistry* on the Editorial Advisory Board of *ACS Nano*.

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