Single Molecule Spectroscopy and Chemical Dynamics at Room Temperature

X. Sunney Xie, *Pacific Northwest National Laboratory, Environmental Molecular Sciences Laboratory, Richland, WA 99352.*

Recent advances in near-field and confocal fluorescence microscopy have made it possible to conduct spectroscopic measurements on single molecules in ambient environments. On the millisecond to minute time scale, single molecule trajectories of conformational motions and spectral fluctuations can be directly recorded. On the picosecond to nanosecond time scale, repetitive processes of single molecules, such as photo-induced chemical reactions, can be studied in specific local environments. We are applying the techniques to study electron transfer and energy transfer processes at interfaces as well as on photosynthetic membranes. These studies illustrate the unique and detailed information obtainable from the single molecule experiments.