



## Label-Free and Near-Field Mapping of Molecular Diffusion (Saline Solution/Water) Using Surface Plasmon Resonance (SPR) Refractive Index Field Imaging

Il Tai Kim and Kenneth D. Kihm

Department of Mechanical, Aerospace and Biomedical Engineering  
University of Tennessee, Knoxville, Tennessee 37996

The near-field (less than a few hundred nanometers) molecular diffusion of saline solution (10%) into water is visualized using the SPR reflectance imaging technique as a label-free, real-time, and full-field refractive index (RI) field mapping tool [I. T. Kim and K. D. Kihm, *Experiments in Fluids* Vol. 41, No. 6, pp. 905-916, 2006]. The slightly heavier saline solution invades the water in the near field and the diffusive region is pushed to the water side during the beginning period of up to 7 seconds. After a considerable amount of time ( $t = 10 \text{ min}$ ), complete diffusion is reached to show approximately 5 % salinity in the near-field region.