Analytical Seminar

Thursday, Oct. 2
12:15 pm
Room 1315
Chemistry

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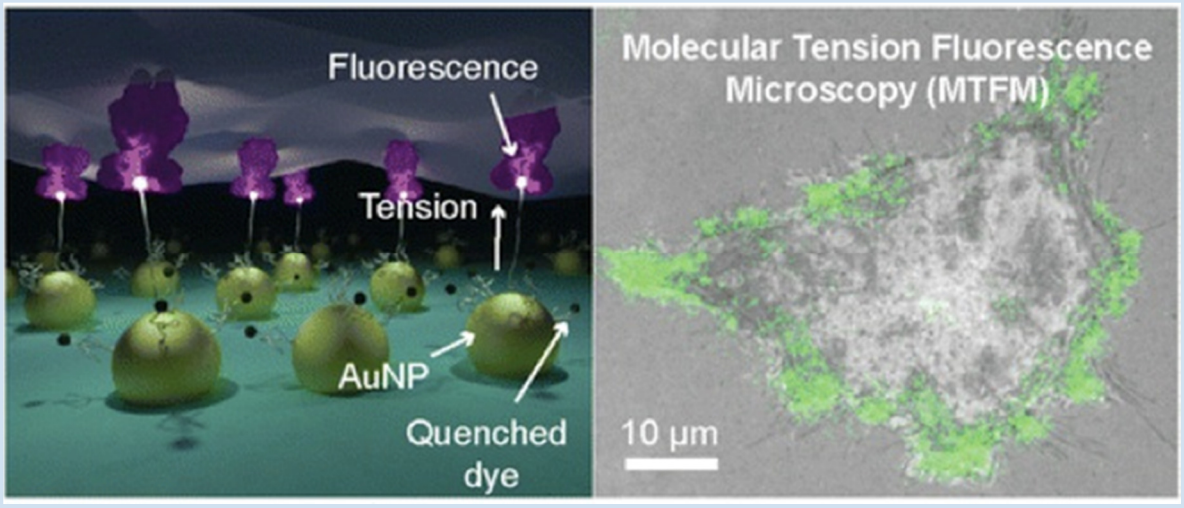

Mechanical forces can profoundly influence chemical and biochemical reactions at interfaces. For example, chemo-mechanical couplings are important in fields ranging from lubrication and tribology to microfluidics, biofouling, and cell biology. A major challenge to understanding the role of forces in biochemical signaling pertains to the lack of molecular tools that allow one to image and manipulate forces at the cell membrane. To address this issue, we have developed a set of fluorescent probes (mechanophores) and actuators to investigate the role of forces in biochemical signaling. In this talk, I will describe the synthesis and characterization of molecular force probes and their application in the area of mechano - transduction. Force probes take advantage of FRET or NSET to determine the extension of an entropic polymer "spring" to quantify tension (*Nat. Methods* 2012, *JACS* 2013, *Biophys. J.* 2013, *Nano Lett.* 2014). I will describe the development of second and third generation force probes that allow one to quantify molecular forces with high spatial and temporal resolution for a range of recombinant proteins. Finally, I will discuss the development and application of optically controlled nanoscale actuators to control cell migration and activation of the Notch and integrin receptor signaling pathways.