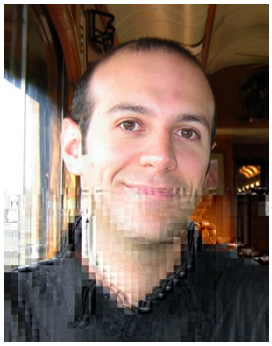
# Mini-Symposium

# Single Molecule Biophysics

**June 3rd, New Biology Building 143**

14:30-15:30 **Dr. Ruben Gonzales**, Columbia University (Also our FIBS seminar speaker)

# Ruben Gonzalez



Ruben Gonzalez graduated cum laude from Florida International University (FIU) with a B.S. in Chemistry and Biochemistry in 1995. While at FIU, Ruben did undergraduate research with Prof. Stephen Winkle in the Department of Chemistry and Biochemistry, where he investigated the thermodynamics and kinetics of protein and carcinogen binding to unusual DNA structures. Notably, Ruben's research in Prof. Winkle's laboratory demonstrated that RNA polymerases could specifically recognize unusual DNA structures formed at the junction of B- and Z-form DNA.

Ruben next moved to the Department of Chemistry at the University of California, Berkeley to do his doctoral research with Prof. Ignacio Tinoco. While in Prof. Tinoco's laboratory, Ruben's research interests focused on the structure and thermodynamics of a specific RNA structure, known as an RNA pseudoknot, which is involved in the translational control of gene expression in many viruses. In particular, Ruben was interested in how specific binding of divalent metal ions stabilize RNA pseudoknot structures. As part of his research in Prof. Tinoco's laboratory, Ruben helped develop now widely-used methodology for using cobalt (III) hexammine as a mimic of magnesium (II) hexahydrate in order to determine the solution structure of a divalent metal ion binding site in an RNA pseudoknot using nuclear magnetic resonance spectroscopy.

Upon obtaining his Ph.D. in Chemistry in 2000, Ruben moved to Stanford University where he did postdoctoral research as an American Cancer Society Postdoctoral Fellow in the laboratories of Prof. Joseph D. Puglisi in the Department of Structural Biology and Prof. Steven Chu in the Department of Physics and Applied Physics. While at Stanford, Ruben helped integrate expertise from Profs. Puglisi's and Chu's laboratories in order to pioneer the first single-molecule fluorescence investigations of the ribosome, the universally-conserved RNA-based molecular machine responsible for protein synthesis in all living cells.

Ruben joined the Department of Chemistry at Columbia University as an Assistant Professor in 2006. Research in his laboratory focuses on the biophysical chemistry and biochemistry of Nature's RNA-based molecular machines, with a current emphasis on the mechanism and regulation of protein synthesis by the ribosome. Research in Ruben's laboratory has been recognized with numerous awards, including a Burroughs Wellcome Fund Career Award in the Biomedical Sciences, a National Science Foundation CAREER Award, an American Cancer Society Research Scholar Award, a Columbia University RISE Award, a Distinguished Columbia Faculty Award and, most recently, a Camille Dreyfus Teacher-Scholar Award.

## Jingyi Fei

Dr. Fei obtained her B.S. degree in Chemical Physics from University of Science and Technology of China in 2005. She joined in Columbia University as a graduate student, focusing on smFRET biophysics and received her Ph.D. in 2010. Starting from 2011, she moved to University of Illinois at Urbana-Champaign and shifted her area to super-resolution imaging based on single molecule fluorescent probes.

Jingyi's research interest is to use single-molecule biophysical tool and cell imaging technique to answer fundamental biological questions, with a focus on RNA biology. Her doctoral work with Prof. Ruben Gonzalez at Columbia University was focused on studying prokaryotic translation with in vitro reconstituted system using single-molecule fluorescent resonance energy transfer (smFRET). As a postdoctoral fellow of NSF Center for the Physics of Living Cells, She joined the laboratory of Prof. Taekjip Ha, whose research group has pioneered many single-molecule biophysical techniques. During her postdoctoral training, she have made great efforts to drive the improvements in super-resolution imaging and data analysis on reconstituted images and have initiated a novel application of these techniques in studying bacterial small RNA (sRNA). Using this super-resolution imaging and analysis approach, she is able to directly observe the sRNA-mediated mRNA degradation, obtain quantitative and localization information, which allow establishing a kinetic model in vivo. In addition, she is also involved in development of RNA aptamer-based imaging systems that allow labeling RNA molecules in live cells.