Special Physics Seminar

" Single-molecule diffusion and conformational studies of MHC Class I proteins in fibroblast cells"

Dr. Ahmed A. Heikal

Department of Chemistry and Biochemistry, and Department of Pharmaceutical Sciences,

University of Minnesota, Duluth.

Thursday, February 4th at 4:00 p.m.

South Engineering 221, NDSU

Major histocompatibility complex (MHC) class I proteins present pathogen peptides to effector T lymphocytes to trigger the destruction of infected cells. The assembly of MHC I proteins in the endoplasmic reticulum (ER) involves their binding to a number of ER chaperones and accessory proteins, which supply the proteasome-generated peptides in the cytosol to the nascent MHC I. Peptide-loaded MHC I proteins then dissociate from transporter associated with antigen processing (TAP) complex. The mechanisms by which MHC proteins are transiently retained in the ER are not understood. Conventional biochemical analyses are inherently incapable of characterizing the association dynamics of MHC I with the TAP complex. In this contribution, I will present our recent single-molecule studies of GFP-encoded MHC I diffusion in living mouse fibroblast cells. Using multimodal and noninvasive fluorescence micro-spectroscopy methods, we also quantified the intracellular distribution, lateral heterogeneity, and conformational dynamics of MHC I proteins in living cells under different conditions of proteasome inhibition and peptide loading.