



Nathaniel V. Nucci

Assistant Professor

Physics & Astronomy/Molecular & Cellular Biosciences

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Education:

BS (Biochemistry and Molecular Biology), University of New Hampshire

MS (Biochemistry and Molecular Biology), University of New Hampshire

PhD (Biochemistry and Molecular Biophysics), University of Pennsylvania

Postdoctoral (Biochemistry and Biophysics), University of Pennsylvania

Research Expertise:

NMR Spectroscopy | Reverse Micelle Technology | Protein Biophysics

Nuclear Magnetic Resonance (NMR) is a state-of-the-art spectroscopic method that provides both spatial and temporal information on the atomic level. This technology is especially insightful when examining macromolecules, but various technical challenges limit the size of the molecules that can be easily studied. I have unique expertise in the application of reverse micelle technology to the NMR-based investigation of macromolecular structure and dynamics. This special skill set allows my research group to ask a range of innovative questions about the ways biological systems function at the molecular level. In addition to NMR, we utilize UV/Visible absorption and fluorescence spectroscopy to investigate biomolecular structure and function. We are also developing an apparatus that combined fluorescence correlation microscopy with microfluidics to study chemical dynamics and the impacts of macromolecular crowding on protein function. Present projects include study of antifreeze protein function, nanoscale confinement effects on protein structure and function, structure/function studies of the hypoxia-inducible factor prolyl hydroxylases, and applications of reverse micelles such as drug delivery and manufacture of quantum dots.

Honors and Awards:

New Jersey Health Foundation Research Grant 2016-2017

Member of:

American Association for the Advancement of Science

Biophysical Society

American Chemical Society

Recent Publications:

Nucci NV (2017) New insight on the S100A1–STIP1 complex highlights the important relationship between allostery and entropy in protein function. *Biochem J.* 474:2977-2980.

O'Brien ES, Nucci NV, Fuglestad B, Tommos C, Wand AJ (2015) Defining the interaction interface between cytochrome c and cardiolipin using reverse micelle NMR. *J Biol Chem.* 209:30879-30887.

Nucci NV, Fuglestad B, Athanasoula EA, Wand AJ (2014) Role of cavities and hydration in the pressure unfolding of T4 lysozyme. *Proc Natl Acad Sci USA.* 111:13846-13851.

Nucci NV, Valentine KG, Wand AJ (2014) High-resolution NMR spectroscopy of encapsulated proteins dissolved in low-viscosity fluids. *J Magn Reson.* 214:137-147.