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Study of the structure and function of collagen as determined by a *Raman-Tweezers* apparatus

Jessica Barrios Hernandez
Appalachian State University, USA

Collagen is the most abundant protein in the human body. It is the main component of the extracellular matrix as well as connective tissues. Understanding collagen is relevant because of its role in wound and burn healing, remodeling of the cervix during birth, engineering tissue, and collagenopathies. In order to study collagen, we have developed a Raman-Tweezers apparatus, a powerful microscope that combines the precision of optical tweezers with the diagnostic capabilities of Raman spectroscopy. Our ultimate goal is to employ this apparatus and develop techniques to study the relationship between the mechanical properties and the structure of collagen fibrils and networks. In order to determinate the elasticity of the collagen protein arrangement, we use optical tweezers to stretch the fibril while simultaneously obtaining a Raman spectrum from a point on the collagen fibril. Since the chemical bonds will be affected by stresses and strains applied to the fibril, we expect the Raman spectrum to change. From our observations, we hope to learn about how this bond configuration affects the elasticity and other mechanical properties of the fibril and of fibril networks.

Biography

Jessica Barrios Hernandez is an undergraduate, senior Applied Physics major at Appalachian State University. She has been working with Jennifer Burris and Brooke Hester since the fall of 2012 at BiyOSeF (Bio-photonic and Optical Spectrometry Facility.) She recently received a North Carolina Biotechnology Center-Undergraduate Biotechnology Research Fellowship for summer 2013.

jabh311@gmail.com