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Mechanisms for semi-flexible filament self-assembly: an experimental and simulation study[1] LAM NGUYEN, Center for Materials Research and Technology (MARTECH), Department of Physics, Florida State University, WEI YANG, STEVE ACQUAH, HAROLD KROTO, Deparment of Chemistry & Biochemistry, Florida State University, LINDA HIRST, School of Natural Sciences, University of California, Merced — The self-assembly of semi-flexible filaments, such as F-actin, in the presence of cross-linkers has been studied experimentally and via molecular dynamics simulation. Several imaging techniques including fluorescence and electron microscopy have been used to elucidate the structural properties of formed bundles and networks of filaments. With the help of simulation we are able to observe the dynamical process of the self-assembly and study the driving forces behind filament aggregation. The roles of different parameters such as cross-linker density and filament length have been investigated, determining the assembled system properties. We find both of these parameters to play a key role in the final structure formation. Understanding the mechanism for the self-assembly of these semi-flexible filaments will be very useful in the application of developing a new class of biological materials.

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Lam Nguyen
Center for Materials Research and Technology (MARTECH),
Department of Physics, Florida State University

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