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# Type I collagen fibril formation in the presence of nano-carbons

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The use of nano-materials in tissue engineering is being widely researched and many applications currently exist. Recently it was realized that the extra-cellular matrix (ECM) is an intricate interweaving of nanometer sized protein fibers (mainly collagen). Replicating the ECM remains a challenge and is crucial for applications ranging from skinand organ replacement to testing drug toxicity. Currently there are several fabrication methods for replicating the ECM, each of which have numerous drawbacks including, lack of repeatability and failure to replicate internal fibrillar collagen structure.This research utilizes a shear spinning method to self-assemble collagen fibers in the presence of several different nano-carbons. Differential scanning calorimetry results show similar melting peaks for both control collagen and collagen composite fibers indicating the addition of nano-carbons does not affect the triple helix stability. Wide-angle X-ray diffraction patterns of the collagen fibers show a strong meridional reflection with spacing of 0.282 nm, which remains constant upon the addition of nano-carbon indicating the collagen molecule repeat distance is also unaffected by the nano-carbons. Additionally a strong equatorial reflection at 11.6 Å is observed for collagen fibers which increases in size with the presence of the nano-carbons indicating a slightly increased lateral spacing of the collagen molecules in the composite fibers. Preliminary results give insight that nano-carbons may have an effect on collagen self-assembly and molecular packing, while the stability and structure of the collagen molecules does not seem to change in their presence.

## Biography

Emily is currently pursuing her Ph.D. in Mechanical Engineering with a concentration in Materials Science at Northeastern University. Her research efforts include polyethylene composite fiber crystallization and collagen self-assembly. Prior to attending Northeastern she was a R&D engineer at Aspen Aerogels, a small manufacturing company in Northborough, MA. She received bachelor's degrees in both mechanical engineering and chemistry from Union College in Schenectady, NY.She has published three articles in peer-reviewed journals and is currently involved in several organizations including the Society of Women Engineers, the American Chemical Society (ACS), the Materials Research Society (MRS), and the Society for the Advancement of Materials and Process Engineering (SAMPE).

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