

MS41-P2 X-ray scattering–based studies of nano/bio-structures with hierarchical order for nanomedicine applications

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The application of nanotechnology in medicine offers numerous exciting possibilities in healthcare. The current and promising applications of nanomedicine include, but are not limited to, *drug delivery*, *theranostic* and *tissue engineering*, which are among the many beneficiaries of nanotechnology. Some of these opportunities are becoming realities or are being used today, while others are generating promise in their early phases of development and are expected to experience vigorous growth in the foreseeable future. As recognition of the importance of this exciting field, it was expected that the global market of nanoscale applications in the medical field could have grown to \$70 - \$160 billion by 2015.^{1,2} So far, regarding drug delivery, there are over two dozen nanotechnology-based therapeutic products approved by Food and Drug Administration (FDA) for clinical use, and more are in clinical trials.³⁻⁵ The majority of these products are composed of a non-targeted delivery system (e.g. liposomes and polymers) and a drug, and are therefore considered first generation nanotherapeutics⁶.

In the present work, small and wide angle X-ray scattering techniques have been adopted to characterize the morphology and structure of:

- “nanoparticles in solution”⁷
- “self-assembled PEGylated tetra-phenylalanine derivatives”⁸
- “collagen tissues”
- “mineralized tissues”⁹

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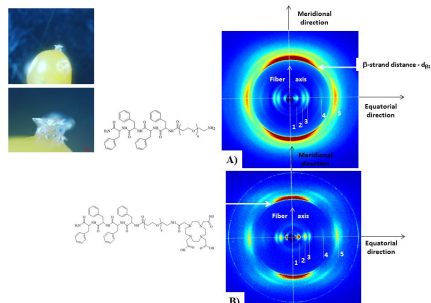


Figure 1. (a) and (b) show the two-dimensional SAXS pattern collected on self-assembled PEGylated tetra-phenylalanine fibers. A photo of the typical fiber is also displayed.

Keywords: SAXS, WAXS, nano/bio structures, hierarchical order, nanomedicine