

Nanostructure Characterization of Biocomposites by Synchrotron Scattering

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The lecture focuses on the current status and future trends of the simultaneous small-angle X-ray scattering (SAXS) and wide angle X-ray diffraction (WAXD) technique ¹ to characterize the nanostructure of biomaterials. By nature, SAXS probes relatively large-scale structures, in contrast to WAXD that deals mainly with the atomic structure of ordered phase. SAXS includes not only the diffraction of large lattice spacing, of the order of tens, hundreds or even thousands of inter-atomic distances, but also the scattering by perturbed or non-periodic structures of amorphous and semi-crystalline materials. The state-of-the-art visualization technique for extraction of the superstructure information in reciprocal spacing from supramolecular systems will be described. The superstructure of materials organized on a nanoscopic length scale often determines the functionality of such systems. In one example study, the biocomposite material from native fish bone, consisting of inorganic mineral crystals reinforcing an organic nanofibrous matrix, will be considered in detail ².

1. B. Chu and B. S. Hsiao, "Small Angle X-ray Scattering of Polymers" in Chemical Reviews, 101(6), 1727-1761 (2001).
2. This is a collaborative project with Benjamin Chu, Christian Burger (Stony Brook) and Melvin Glimcher (Harvard Medical School).

Bone Superstructure and Function

