

Freezing-induced self-assembly of bioinspired structural materials

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W-501 Seminar room, 5F WPI/MANA Bldg.,
Namiki-site



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Abstract

Materials that are strong, ultra-lightweight, and tough are in demand for a range of applications, requiring architectures and components carefully designed from the micrometer down to the nanometer scale. Inspiration can be taken from the lessons learned from the observation and characterization of natural materials, which are built at ambient temperature from a fairly limited selection of components. Nacre, a structure found in many molluscan shells, and bone are frequently used as examples for how Nature achieves this through hybrid organic-inorganic composites. Unfortunately, it has been proven extremely difficult to transcribe nacre-like clever designs into synthetic materials, partly because their intricate structures need to be replicated at several length scales. After introducing the concept of bioinspiration, I will illustrate how such ideas can be implemented to process advanced structural materials based on a freezing-induced self-assembly approach.