

## Bioinspired Materials: a matter of structure

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Biological materials have been a valuable source of inspiration for the design and fabrication of synthetic materials and devices that can help overcome limitations of man-made technologies and address important societal challenges. Such bioinspired approach has led to major advancements in adhesive technologies, self-cleaning and anti-fouling surfaces, self-healing materials and tough lightweight structures. Although the chemistry of such bioinspired materials plays a major role on their final functional response, it is often the structure of the material across length scales that provides biological materials with a significant advantage over synthetic counterparts. In this lecture, we will discuss current research efforts dedicated to the design and fabrication of materials whose properties and functionalities arise primarily from their controlled structure at multiple length scales. The concept of multiscale structural design will be addressed using examples of lithographically-patterned surfaces as well as bulk materials made by additive manufacturing approaches. Bioinspired structural design will be shown to be a powerful approach towards interfaces that controllably interact with living systems or bulk materials that are fracture-resistant despite the brittle nature of their constituent phases. Finally, an example of translation of one of these structural design concepts to technological applications will be presented to engage students into an open discussion about the potential of bioinspired approaches in solving important technological challenges.

### Suggested literature:

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