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Bio-inspired active materials.

PETER FRATZL, Max Planck Institute of Colloids and Interfaces

Biological tissues are naturally interactive and adaptive. In general, these features are due to the action of cells that provide sensing, actuation as well as tissue remodelling. There are also examples of materials synthesized by living organisms, such as plant seeds, which fulfil an active function without living cells working as mechanosensors and actuators. Thus the activity of these materials is based on physical principles alone, which provides inspiration for new concepts for artificial active materials. We will describe structural principles leading to movement in seed capsules triggered by ambient humidity and discuss the influence of internal architecture on the overall mechanical behaviour of materials, including actuation and motility. Several conceptual systems for actuating planar structures will be discussed.