## Innovative Bone Implants Inspired by Marine Sponges

Developing lightweight biomedical materials with optimal mechanical properties presents a significant challenge. This study focuses on replicating the flexural strength and toughness observed in natural spicules. Using stereolithography (SLA) 3D printing, spicule-inspired structures were fabricated. The research examines how different processing parameters affect the mechanical performance of these structures. Interestingly, concentric cylindrical structures (CCSs) demonstrated flexural strength that was equal to or greater than solid rods, reflecting the durability seen in natural spicules. A key discovery was the variety of crack propagation patterns in CCSs, which showcased their enhanced resistance to failure in bending tests. This research highlights the potential of spicule-inspired designs, utilizing concentric cylindrical layers to transform brittle structures into flexible, lightweight materials suitable for load-bearing applications.