# Prasad Lab for Materials Research

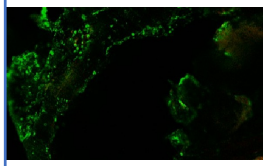
We use the mechanics of materials to build **regenerative scaffolds for bone and heart repair**, design **multifunctional composites for defense and electronics**, and advance **plant mechanics and precision agriculture**, combining nanomechanical experiments, manufacturing, and multiscale simulation.

## Regenerative engineering

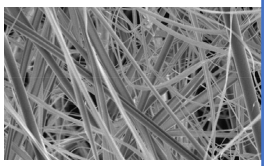
Scaffolds and devices for bone and heart repair



Open-source bioreactor for loading bone tissue



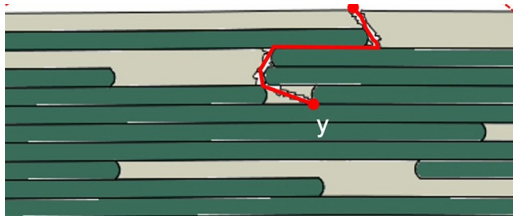
Live/dead staining of cultured bone



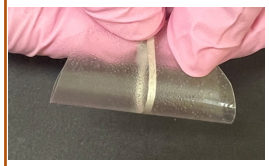
Electrospun cellulose fiber scaffold

## Multifunctional composites

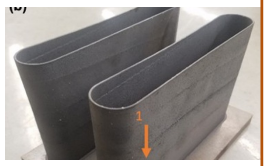
New materials for defense and electronics




Crack path in a MXene–polymer nanocomposite



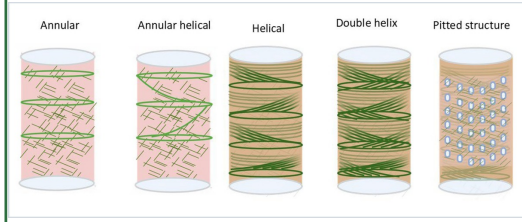
Flexible electronic substrate



3D-printed GRCop-42 alloy for rocket engines

## Plant mechanics/Precision Agriculture

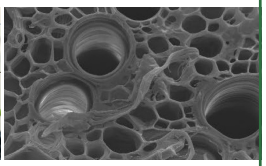
Cell wall mechanics and sensors for plant health




Cell wall patterning in growing xylem vessels



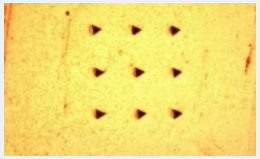
Wearable stem growth sensor

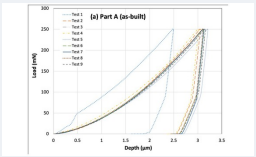


Xylem tissue under the electron microscope

## Mechanics and Manufacturing Toolkit Snapshot

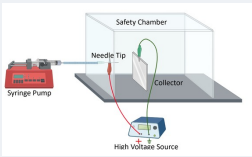
### Nanomechanical experiments

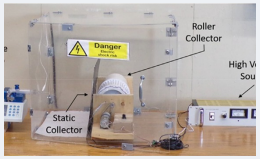




Indent arrays and load–depth curves

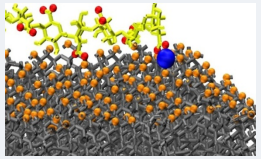
### Manufacturing

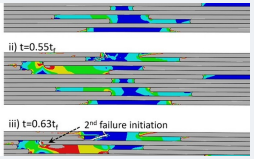



Lab-built electrospinning for fiber scaffolds

### Multiscale simulation






Molecular dynamics to finite element models

Figures adapted from Prasad Lab publications, 2020–2026

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