



Laboratory of Soft Materials Mechanics and Manufacturing (LASM³)

Human engineers hard materials



Nature engineers soft

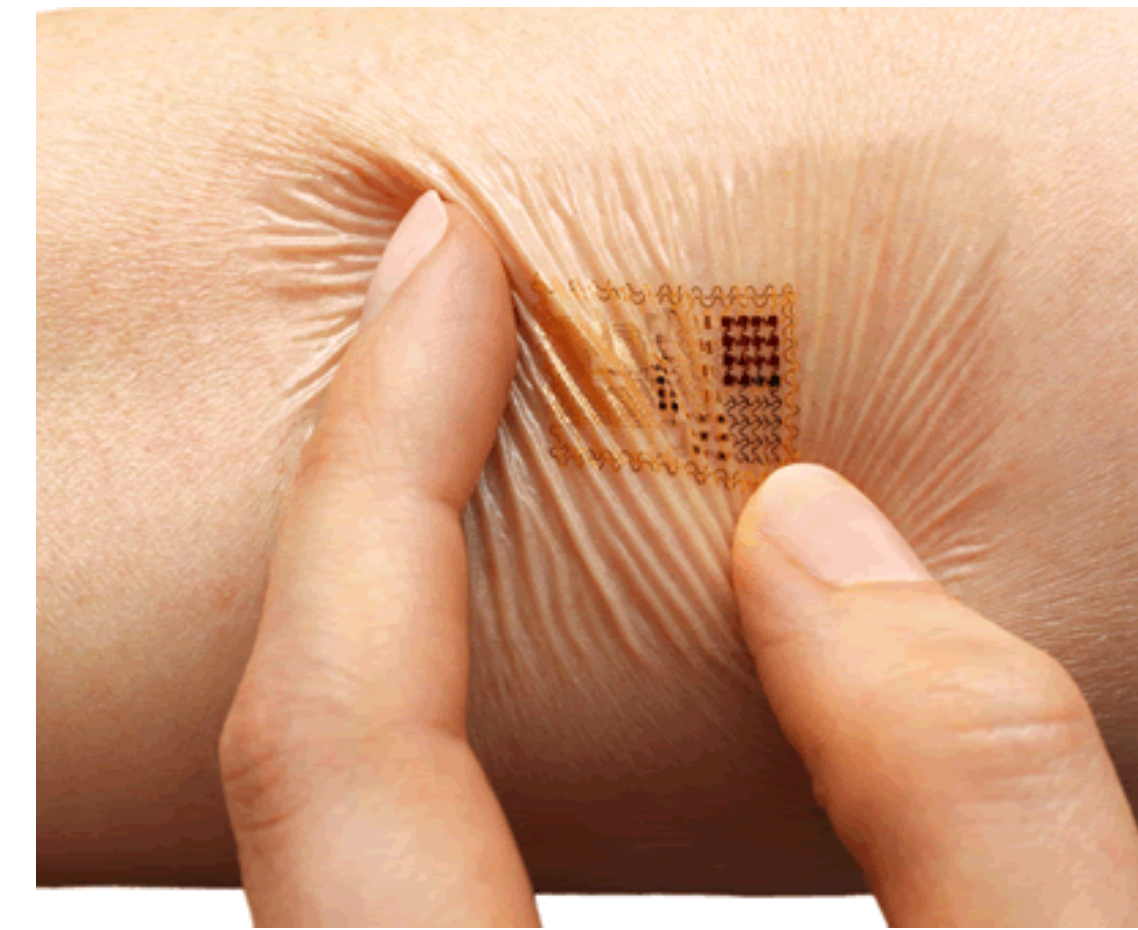


We love to interact with soft

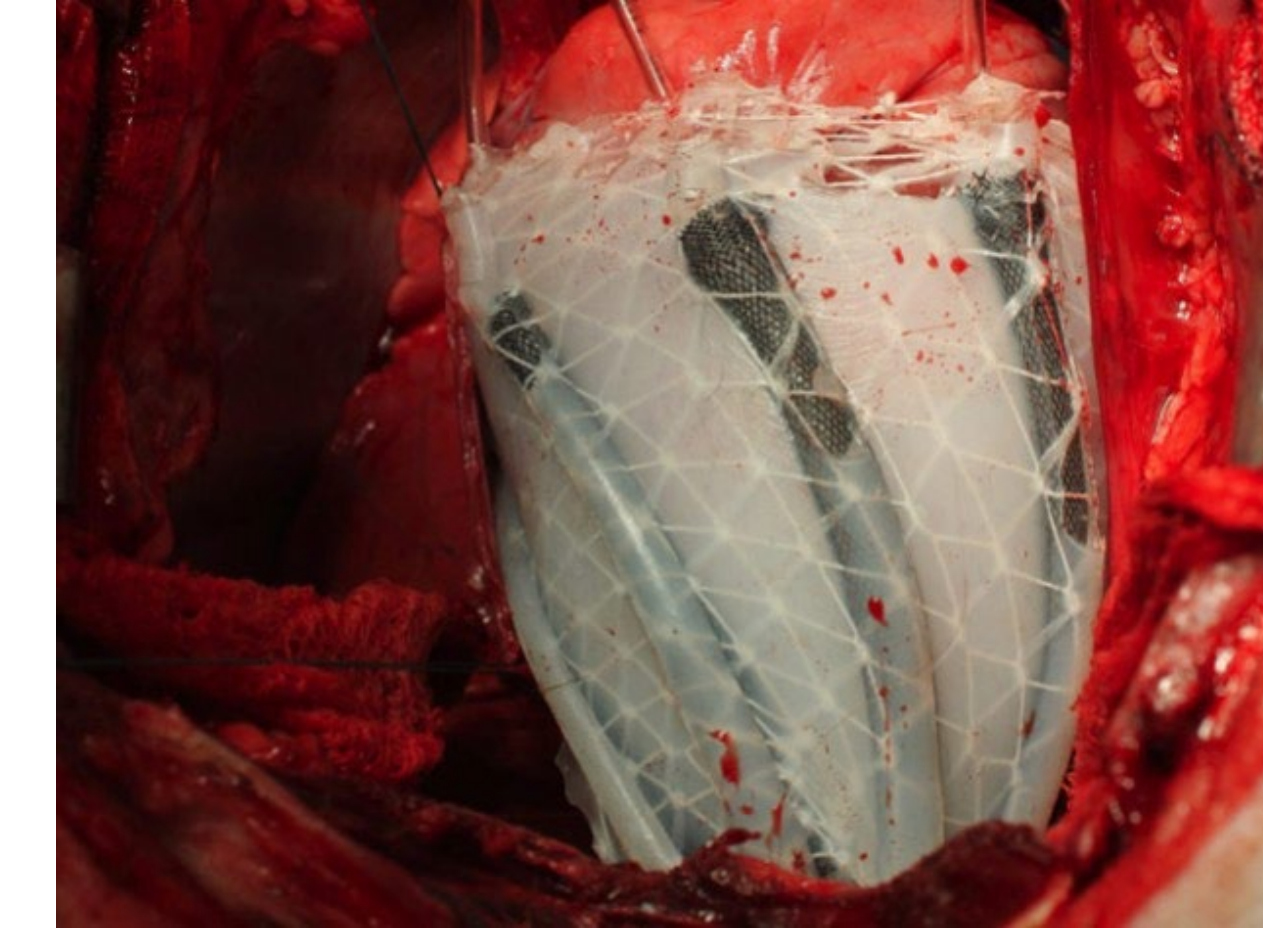


Let's engineer soft materials to:

Interface human and machine



Cure disease



Do what hard materials cannot!



Make us stronger



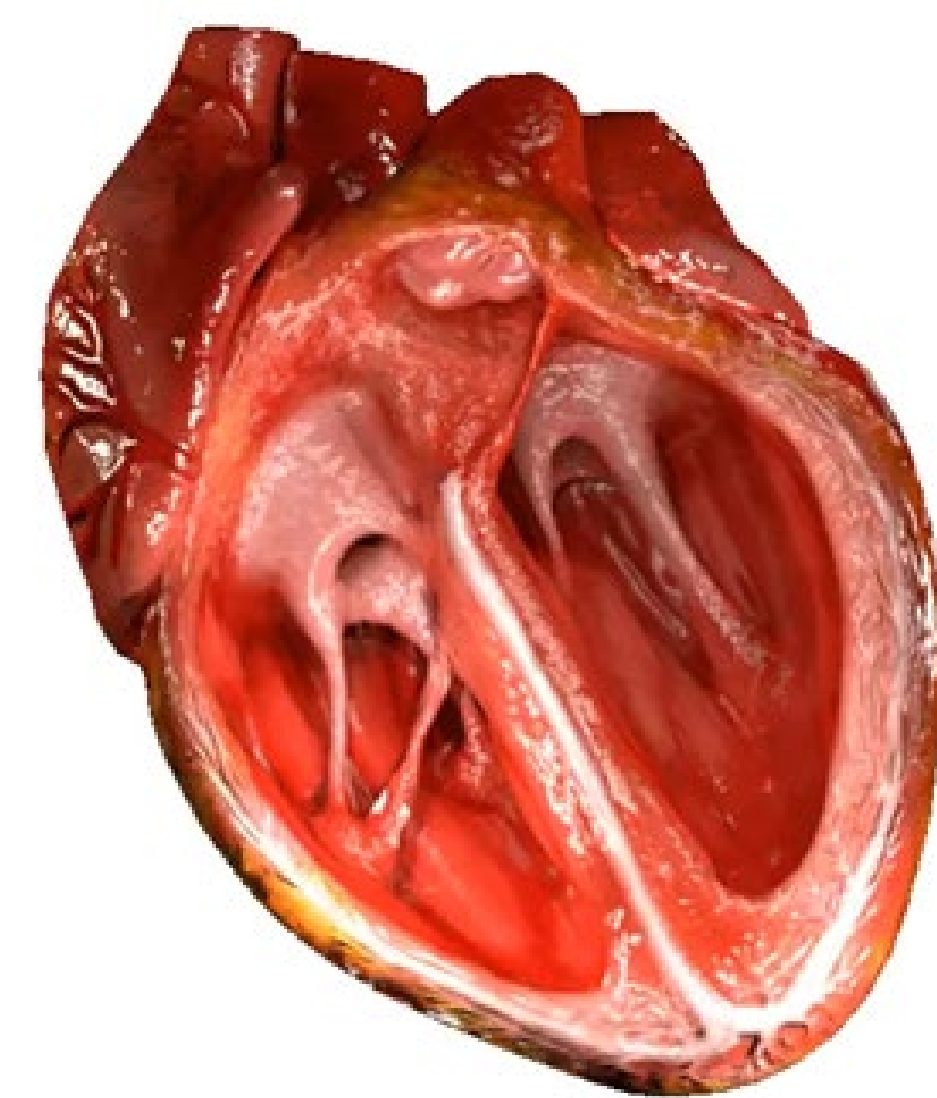
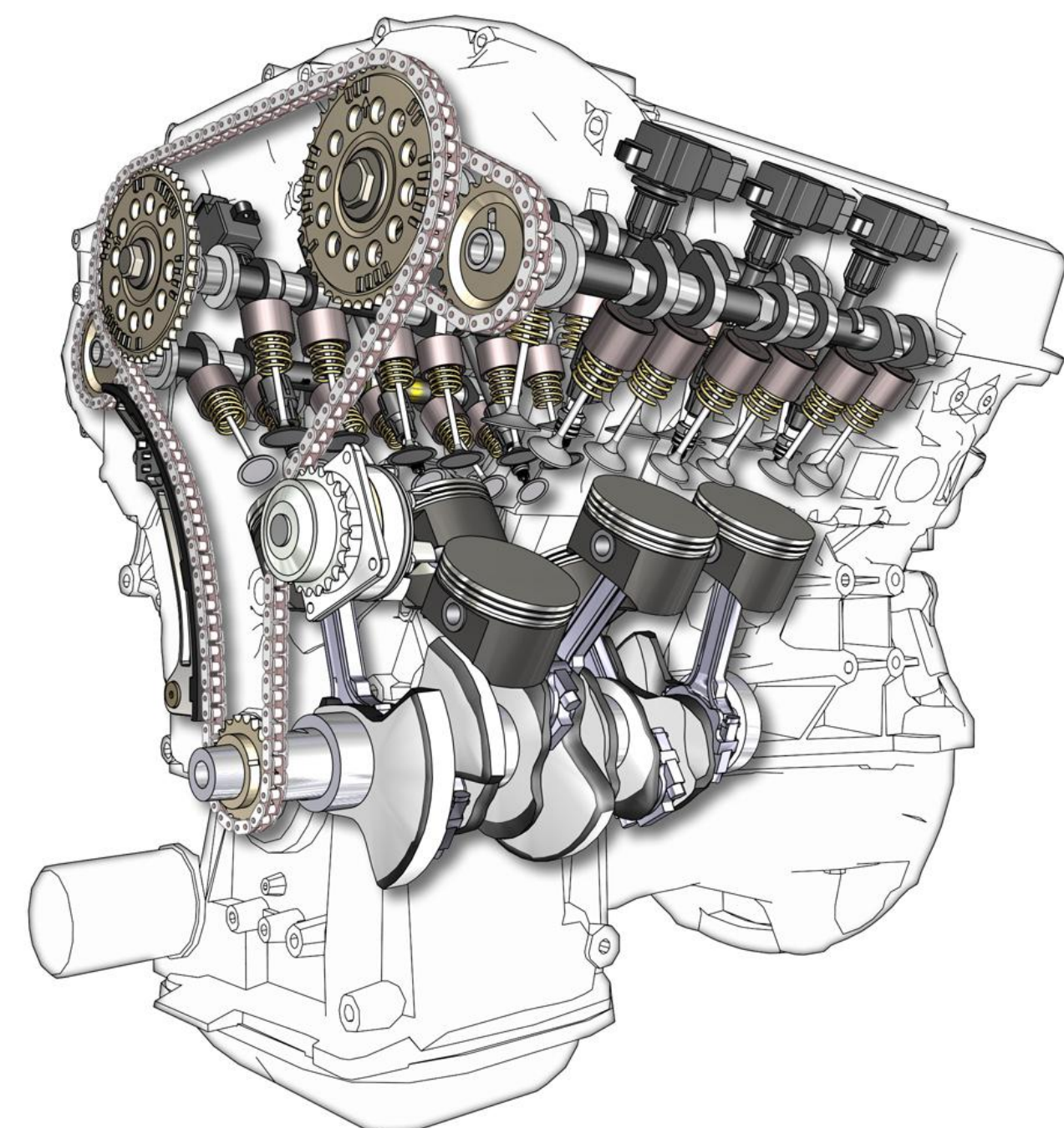
Replace human labor



Soft Materials

Mechanics underlies Designs

Mechanics differs for hard materials and soft materials

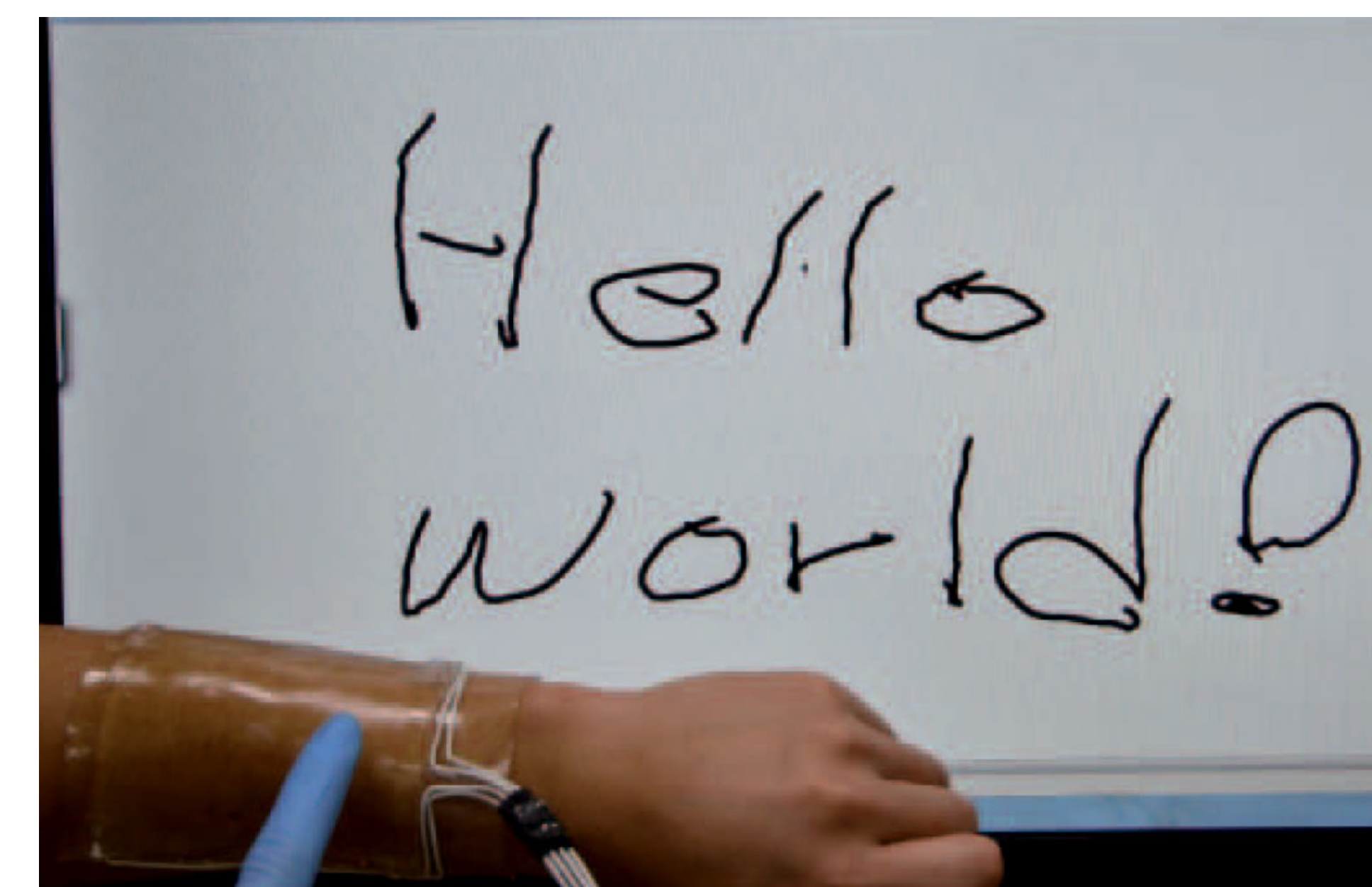


Rigid body dynamics
Small deformation
Passive material

Continuum mechanics
Nonlinear deformation
Active material

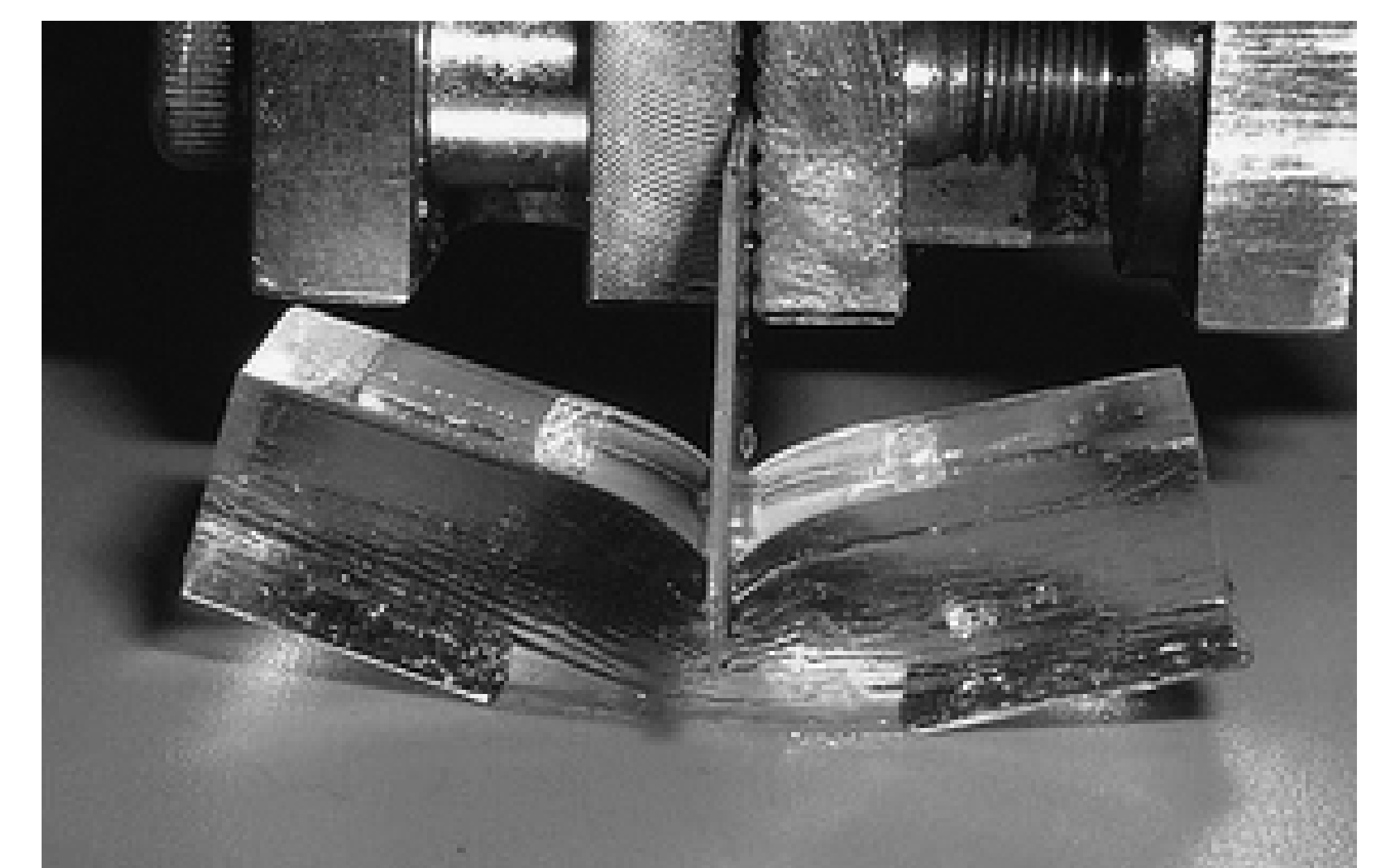
We study mechanics to design powerful soft devices:

How to realize complex functions?



- Stimuli responsiveness
- Instabilities
- Soft electronics / ionotronics
- Response speed

How to guarantee robust operation?

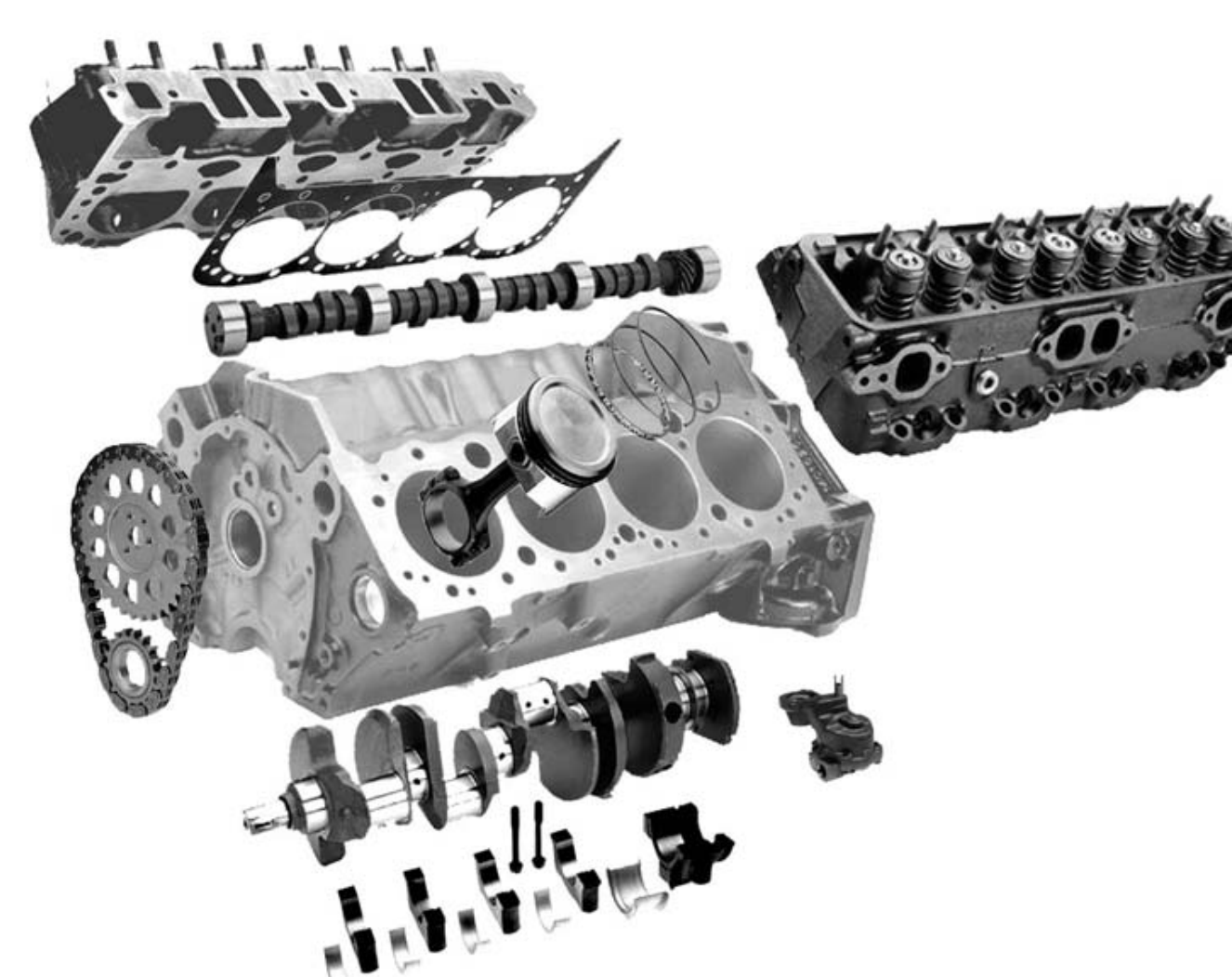


- Toughness
- Strength
- Extensibility
- Fatigue resistance

Mechanics

Manufacturing dictates Implementation

Manufacturing tools for hard materials do not apply to soft materials



Machining?

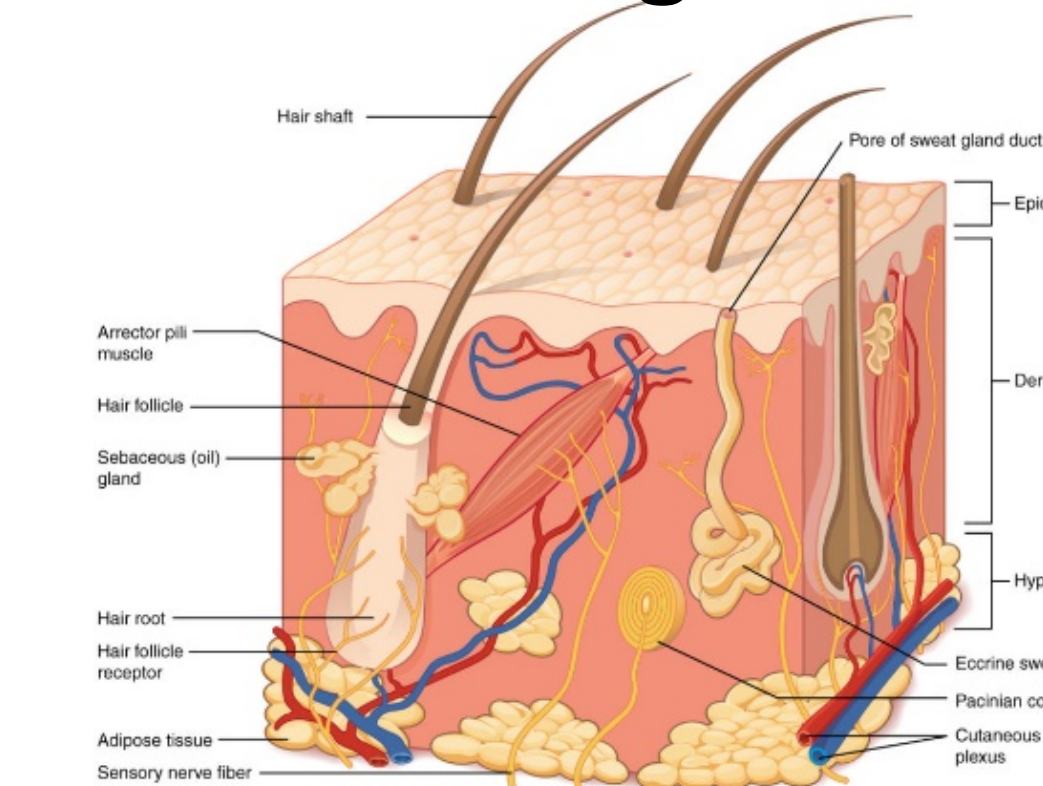
Large deformation makes cutting inaccurate

Assembling?

Deformable materials cannot be held by friction

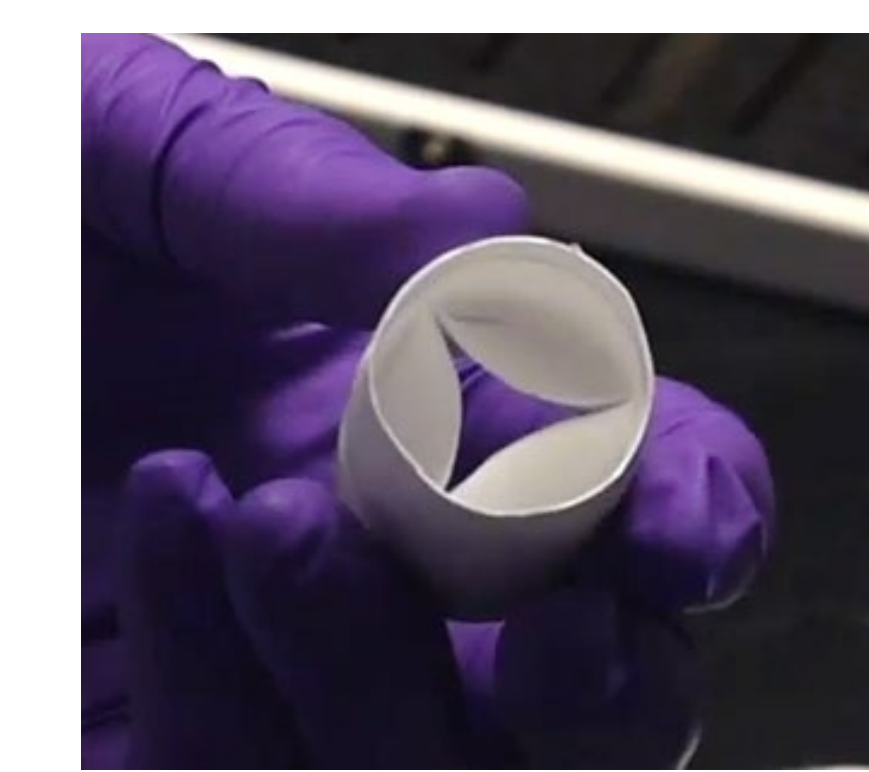
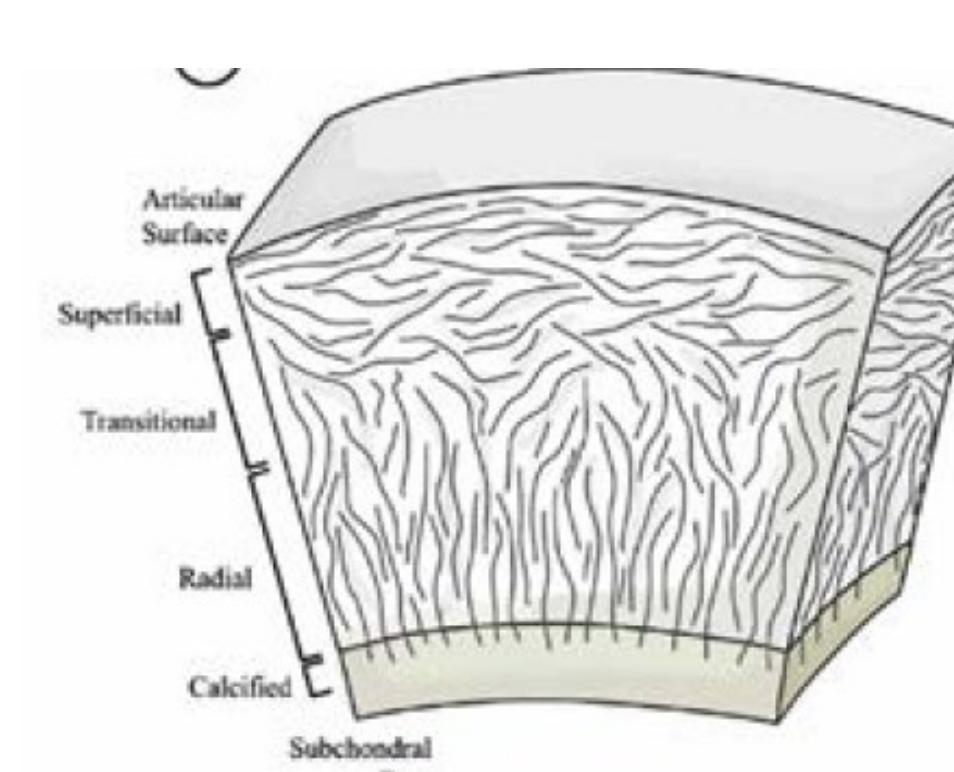
We develop manufacturing tools to unleash the power of designs:

Integrate different materials



- Nature combines different materials to realize complex functions.
- We need to bond different materials in various manufacturing conditions.

Generate microstructure



- Nature uses microstructure to realize superior material properties.
- We need to reproduce microstructure with high-throughput

Manufacturing