

BME341 Biomaterials



# Lecture #7 Biomaterial Processing-II

Doç. Dr. Pınar Yılgör Huri  
[phuri@ankara.edu.tr](mailto:phuri@ankara.edu.tr)

Ankara University  
Department of Biomedical Engineering

# Processing to Form Desired Shapes

- Processing methods to produce materials with desired geometries include
  - Forming
  - Casting
  - Powder processing
  - Machining
  - Joining
  - 3D Printing

# Processing of Metals

## Forming Metals

- Forging
- Rolling
- Extrusion
- Drawing
- Casting
- Powder processing
  - Sintering
  - SLS
- Welding

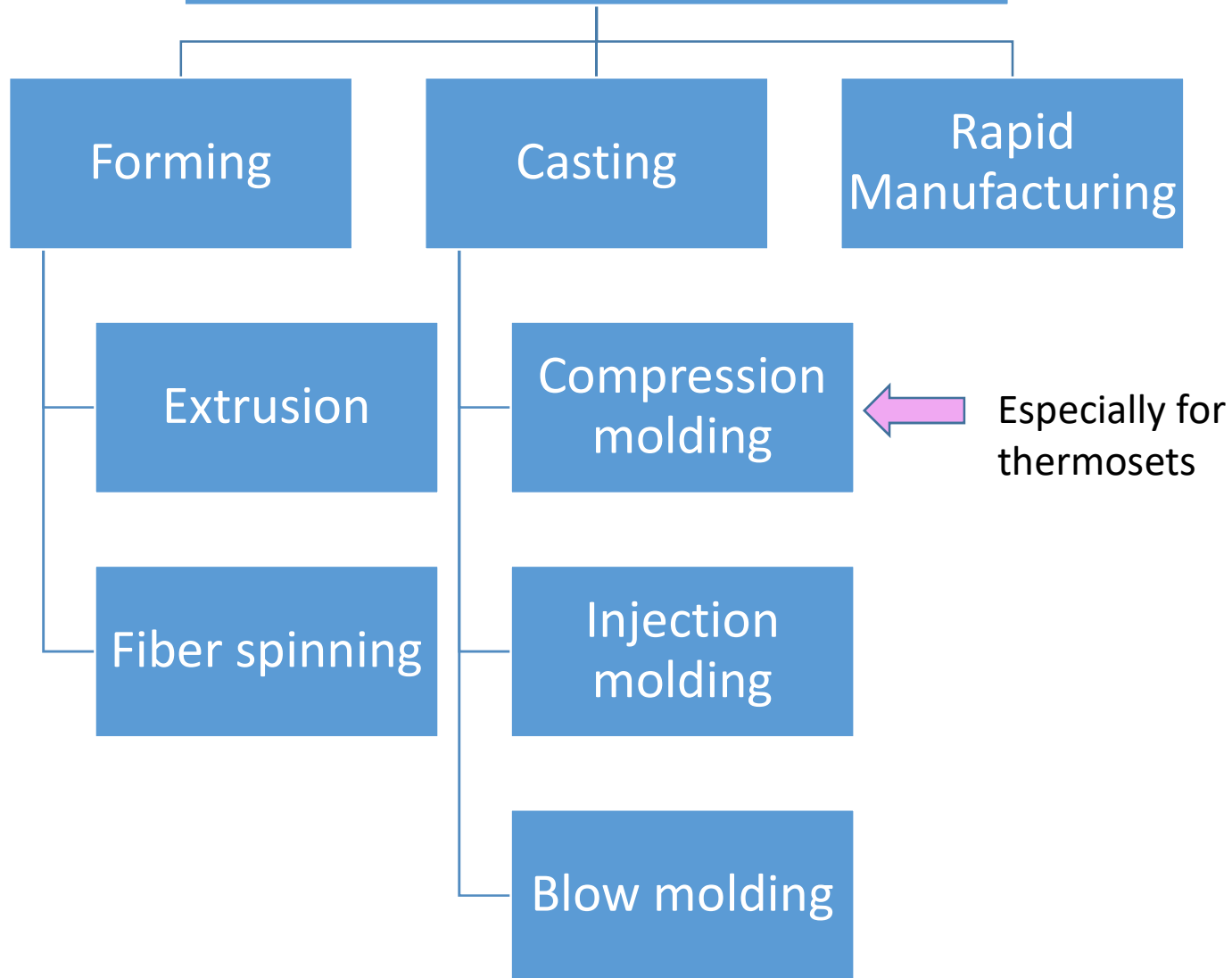
# Processing of Ceramics

- Glass Forming
  - Blowing
  - Pressing
  - Fiber drawing
- Particulate Forming
- Cementation
- Casting
  - Drying
  - Firing

# Processing of Polymers

- Important parameter in selecting appropriate process for polymer processing
  - Thermoplastic
  - Thermoset
- Thermoplastic polymers soften (liquify) when heated and harden when cooled.
- Thermosetting polymers become permanently hard when heated to high  $T$  and do not subsequently soften.

# Methods of Polymer Processing



# Sterilization of Implants

Sterile: Absence of all living organisms.

Determination of Sterility:

1. “yes” or “no” result
2. Sterilization validation studies
  - Used to determine “sterility assurance level” SAL

# Sterilization of Methods

1. Steam Sterilization / Autoclaving
2. Ethylene Oxide (EtO)
3. Radiation



# Biomaterial Degradation

- Surface erosion
  - Sample is eroded from the surface
  - Mass loss is faster than the ingress of water into the bulk
- Bulk degradation
  - Degradation takes place throughout the whole of the sample
  - Ingress of water is faster than the rate of degradation