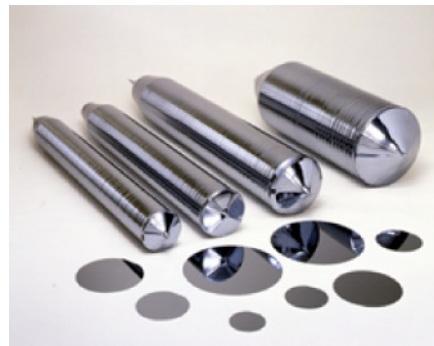
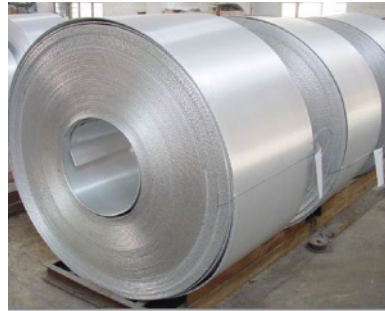


Engineering Material

man-made

- metals
- plastics
- ceramics
- semiconductors
- composites



Biological Material

nature-made, e.g.

- bone
- skin
- seashell
- wood
- rubber



Engineering Material

man-made

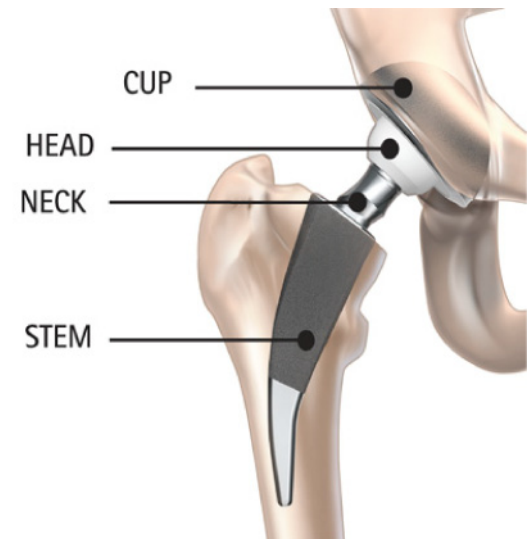
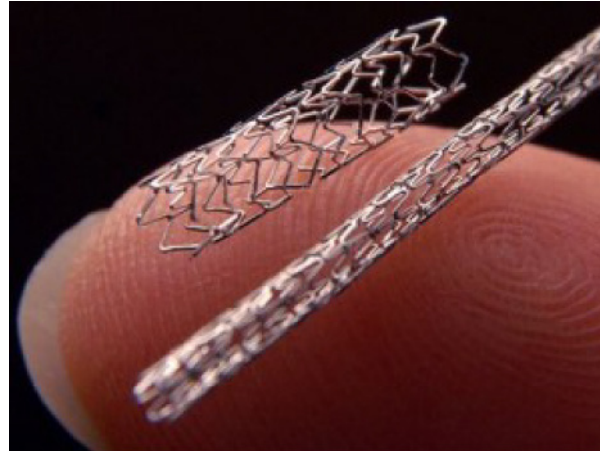
Biological Material

nature-made

— **Biomaterials** →

← **Biomimetic
Materials** —

Biomedical Devices



What is a “Biomaterial?”

METALS

stainless steel
Co-Cr alloys
Ti & Ti alloys
Ni alloys (nitinol)
tantalum
zirconium
Pt-Ir alloys
platinum
gold
silver
Ag amalgam
iridium

CERAMICS

alumina (Al_2O_3)
zirconia (ZrO_2)
DLC
pyrolytic carbon
 CaSO_4
calcium phosphates
BioglassTM
porcelain
glass ionomers
 ZnPO_4
 Ir_2O_3
 Fe_3O_4
 BaSO_4

POLYMERS

UHMWPE
PMMA
acrylics
bis-GMA...
cyanoacrylate
epoxy
polyHEMA
PEEK
polysulfone
polydioxanone
PLLA, PLGA
PCL, PU, PVC
PTFE, PET, PP
DacronTM
nylon
collagen
fibrin glue
silicone

COMPOSITES

bioglass-ceramic
acrylic-ceramic
PMMA bone cement
CFRP
HAPEXTM
CollagraftTM
allograft
xenograft

What is a “Biomaterial?”

- 1) “A synthetic, natural or modified natural material intended to be in contact and interact with a biological system.”
(ISO Technical Report)
- 2) “A material intended to interface with biological systems to evaluate, treat, augment or replace any tissue, organ or function of the body.” (ESB Consensus Conference II, 1992)
- 3) “A synthetic material or processed natural material engineered to evaluate, treat, augment, or replace any component or function of a biological organism, while in continuous or intermittent contact with biological substances.”
(R.K. Roeder + various sources)
- 4) “A synthetic material, usually a plastic, suitable for implanting in a living body to repair damaged or diseased parts.”
(Random House Unabridged Dictionary, 2006)

broad



narrow

What is a “Biomaterial?”

- 1) a knee brace?
- 2) contact lens?
- 3) breast implant?
- 4) contraceptive?
- 5) autograft or heart transplant?
- 6) allograft or xenograft?

What is a “Biomaterial?”

Biological Material = a natural material produced by a living biological organism, e.g., bone, skin, seashell, wood, silk, etc.

Biomimetic Material =
any material engineered to be physically, chemically, or functionally similar to a biological material.
A.k.a., bioinspired material.

