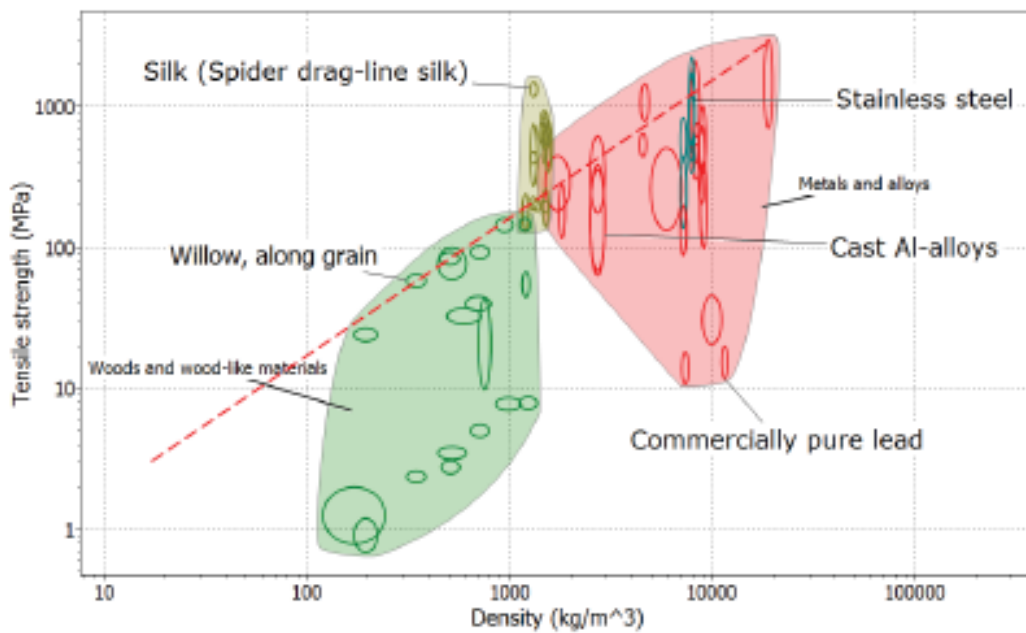


Exercise 1: Biomaterials I

1. List two advantages and disadvantages of the three classes of materials discussed in class. How could a composite material overcome some of the disadvantages?

2. You are looking for a material to design a wire for use in the body which is strong in tension, light and biocompatible. Using the material selection diagrams below, what design criteria can you use? Which synthetic or natural material would be good based on these criteria?



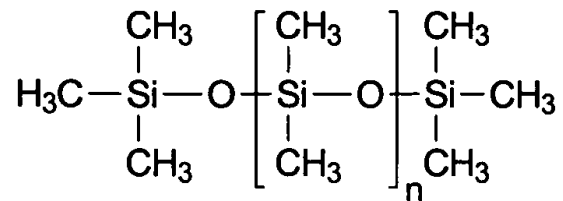
3. The following implant material was tested in uniaxial tension and the following data was obtained:

Strain (%)	Stress (MPa)
0	0
0.06	50
0.1	90
0.16	145
0.2	180
0.3	230
0.4	260
0.5	295
0.6	310
0.7	320
0.8	330

- i) Plot the stress/strain curve and estimate the elastic (Young's) modulus, yield strength, failure strength!
- ii) What kind of material is this? If this material was cold worked, how would the stress/strain curve change?
- iii) Explain on a microstructural level how this change comes about?

4. What polymer is found below?

- a. Silicone oxide
- b. Poly diimethyl silicone oxide
- c. Poly dimethylsiloxane
- d. Poly vinyl chloride



5. What is the molecular weight of polyethylene used in implants?

- a. 300 Da
- b. 300 kDa
- c. 300 mDa
- d. 3 MDa