

ENGINEERING MATERIALS INTRO SS

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Materials for educational purposes



<https://www.metaltek.com/blog/how-to-evaluate-materials-properties-to-consider/>

<https://technobyte.org/engineering-materials-classification-properties-applications/>

MATERIALS SCIENCE

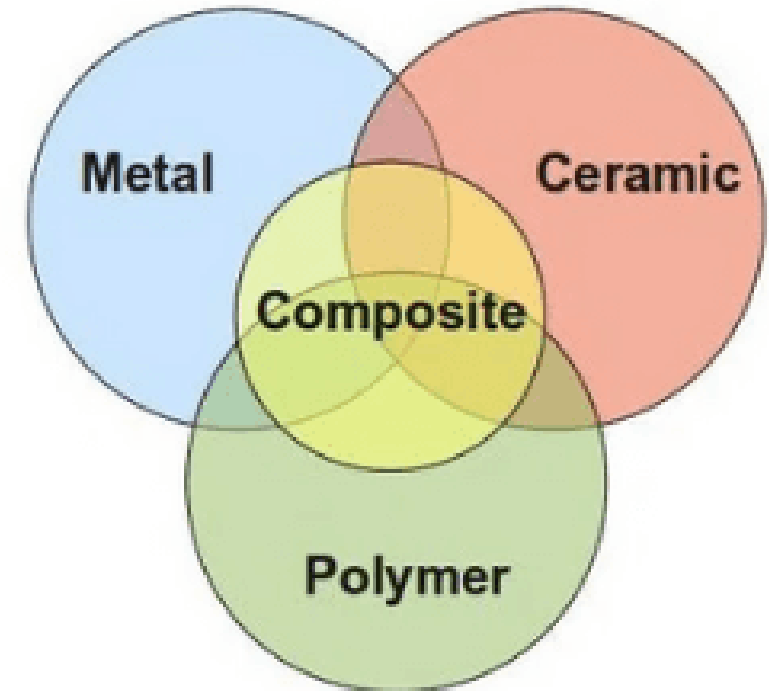
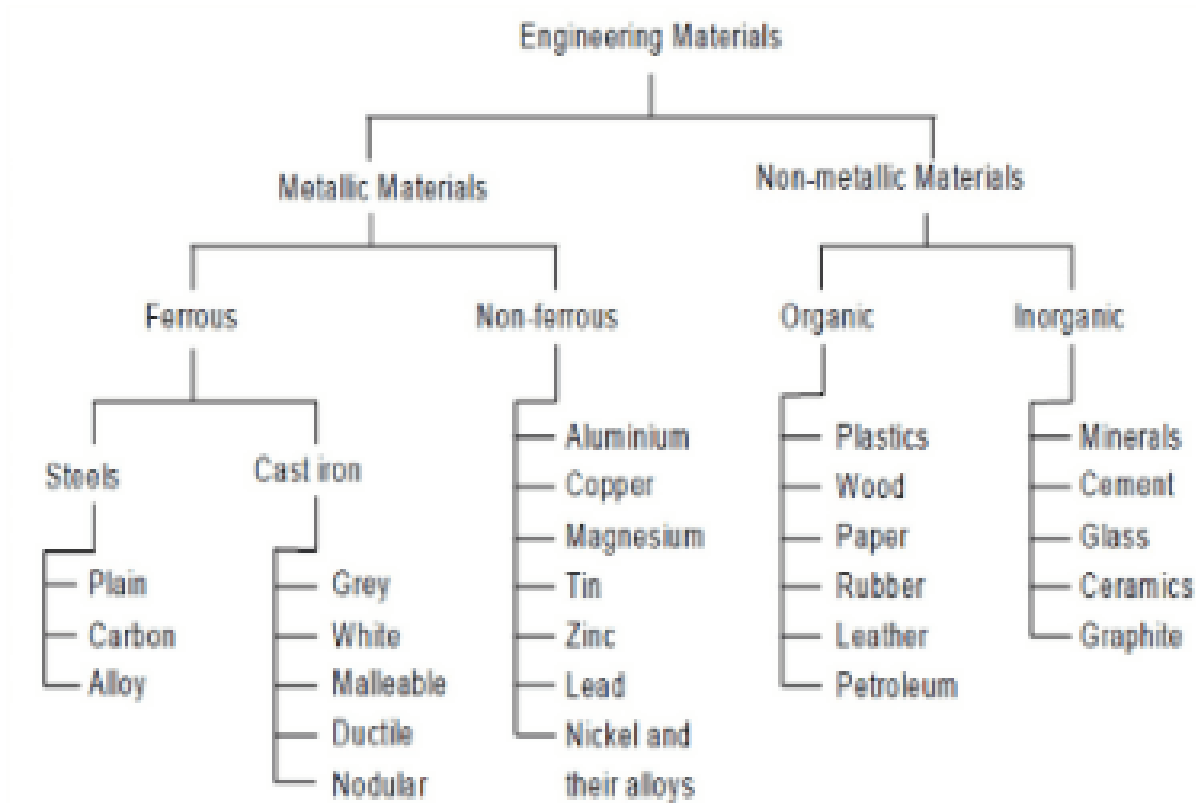
MAGNETISM
SINTERING
POLYPROPYLENE
MINERALOGY
METALLURGY
SOLIDIFICATION
POLYMER
SUPERALLOY
MICROPROBE
ALLOY SYSTEM
BIOMATERIAL
TECHNOLOGY
QUENCHING
COATING
SILICON
PHYSICS
DIAMOND
STEREOCHEMISTRY
SEMICONDUCTOR
HEAT
FIBER
CRYSTAL
NEUTRON
TITANIUM
DARPA
CHEMISTRY
NANOTUBES
NANOMATERIALS
ENGINEERING
MICROSTRUCTURE
AMORPHOUS
ZBLAN

TOOL
CARBON
DIFFUSION
PLASTIC
WELDING
STEEL
GLASS
MICROSCOPE
PHOTONICS
MODELING
MODELING
LITRACON
AEROGEL
SILICENE
TRIBOLOGY
FULLERENE
ENERGY
TALC
KEVLAR

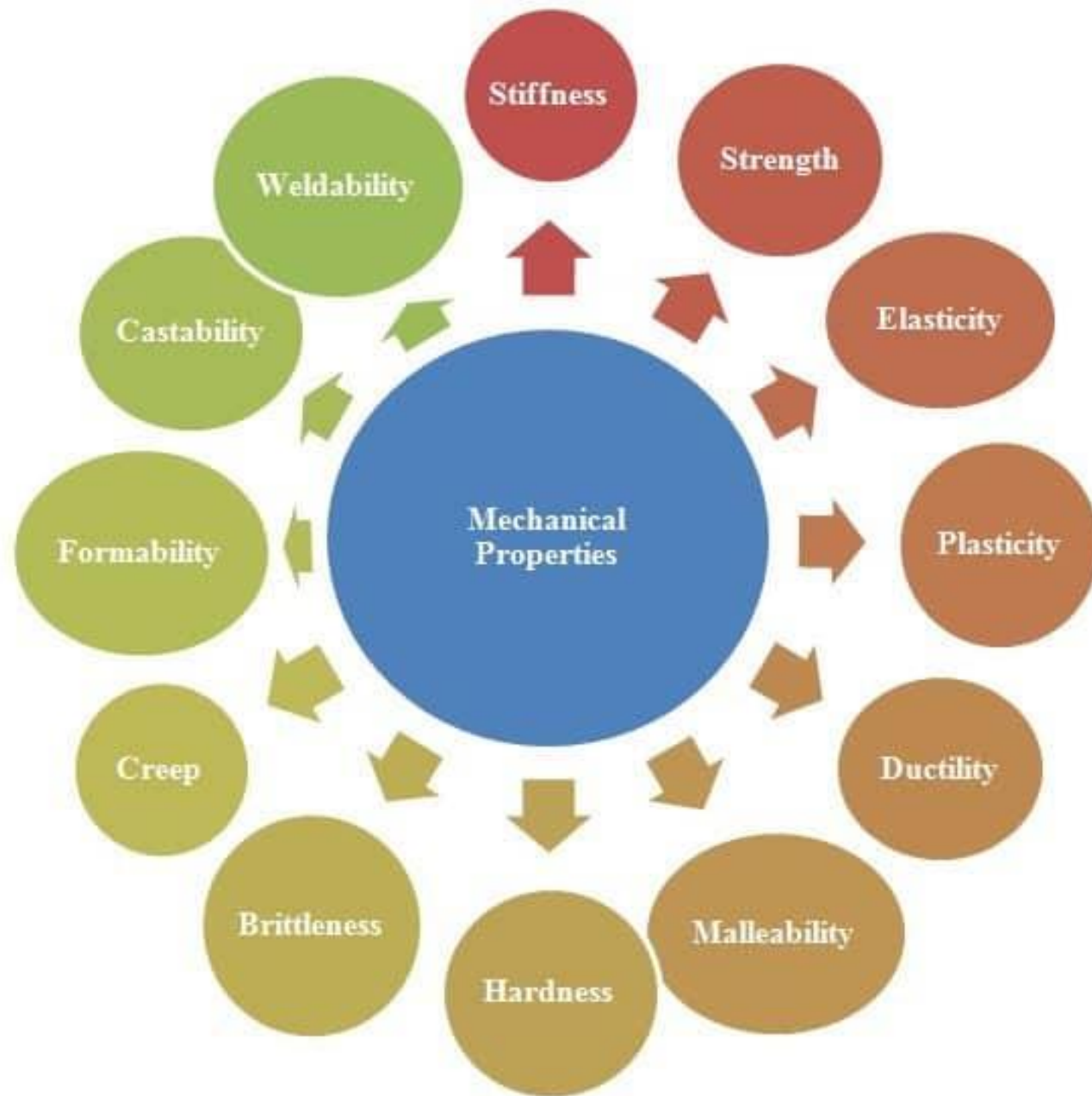
INTRODUCTION

- ❑ Materials are an important aspect of engineering design and analysis.
- ❑ The importance of materials science and engineering can be noted from the fact that historical ages have been named after materials
- ❑ There is a wide variety of materials available which have shown their potential in various engineering fields ranging from aerospace to house hold applications.
- ❑ The materials are usually selected after considering their characteristics, specific application areas, advantages and limitations.

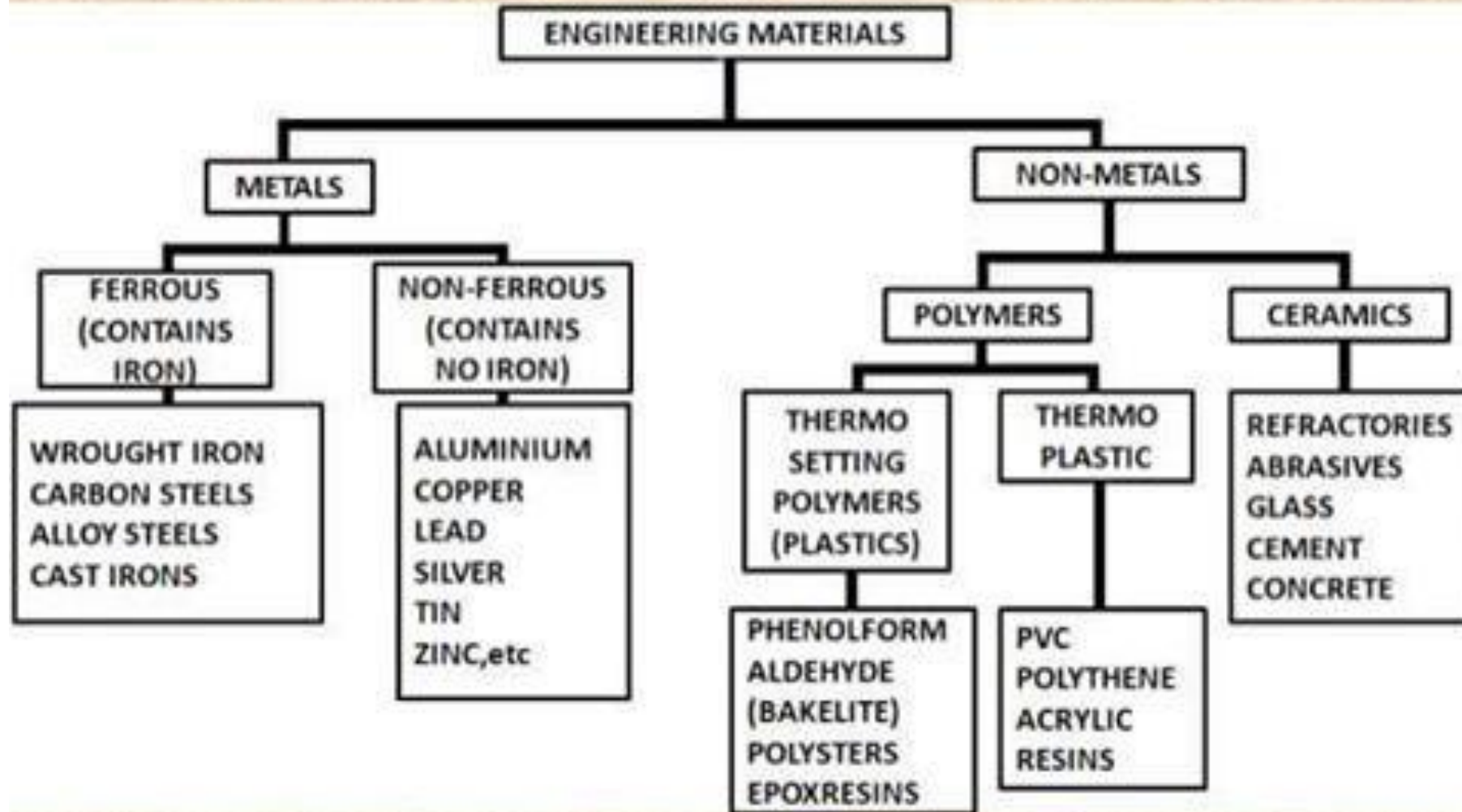
What are the Classifications of Engineering Materials?



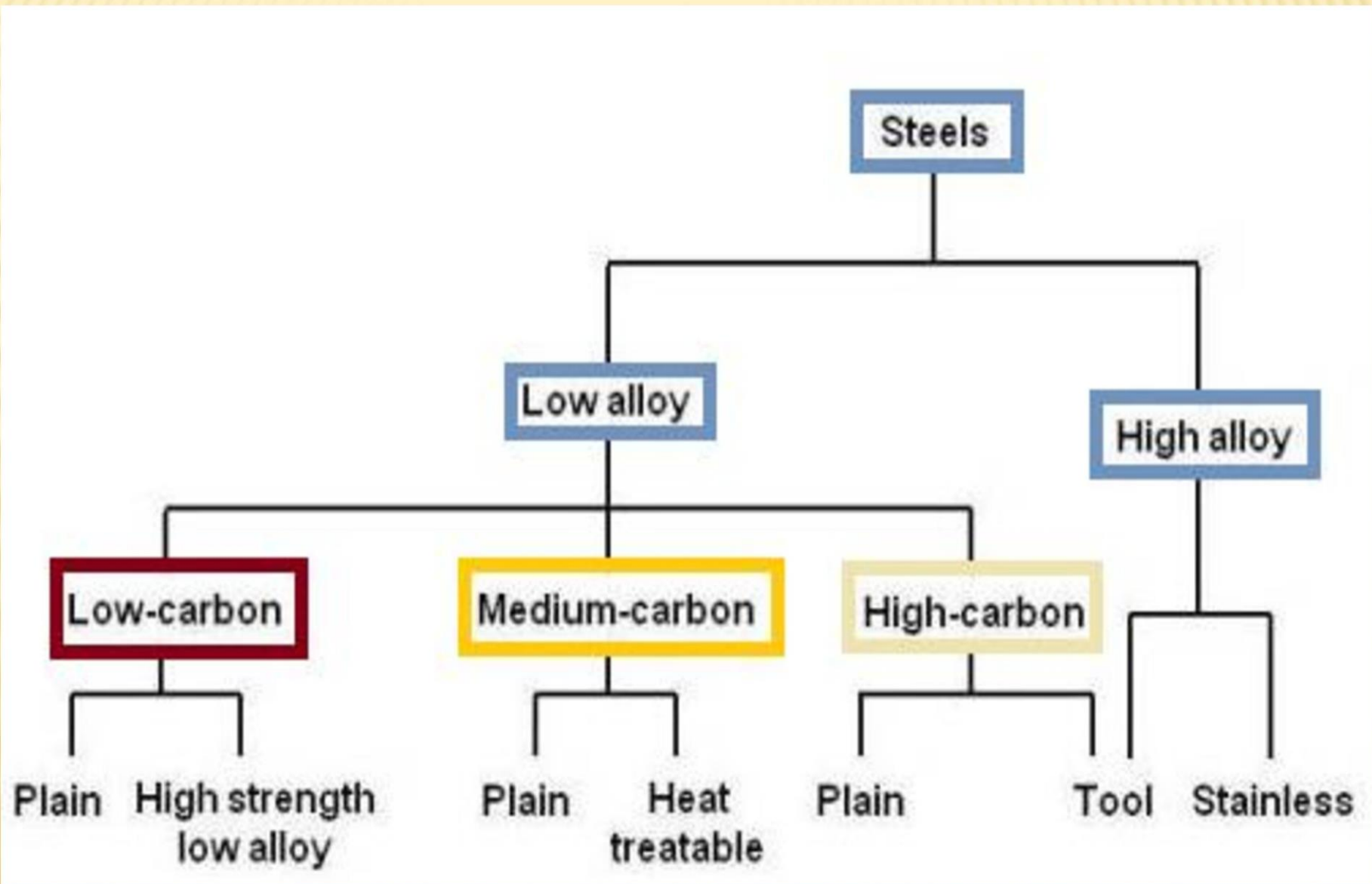
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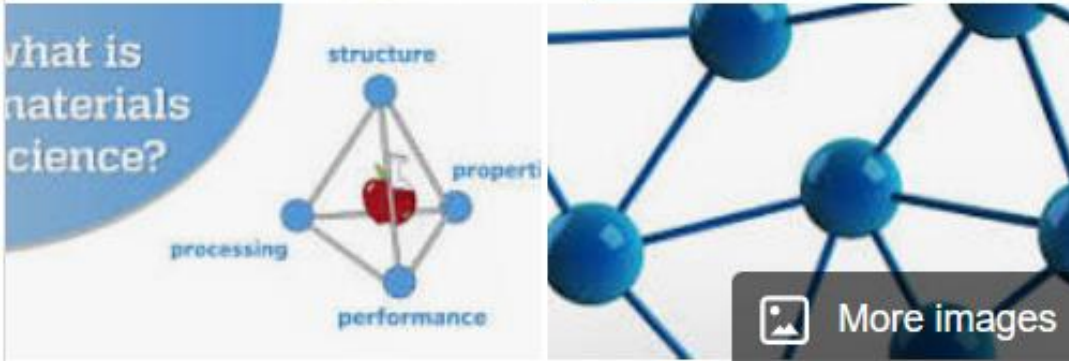
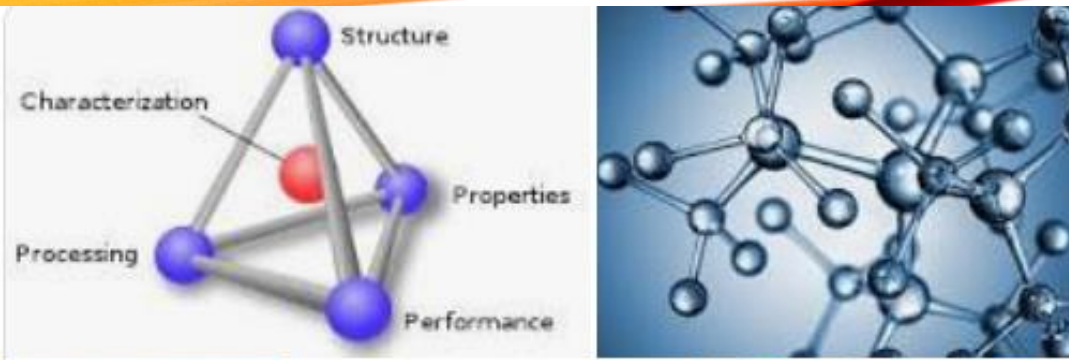


CLASSIFICATION OF ENGINEERING MATERIALS



Classification of Steels





Materials Science



Field of study

Materials science is an interdisciplinary field of researching and discovering materials. Materials engineering is an engineering field of designing and improving materials, and finding uses for materials in other fields and industries. [Wikipedia](#)

THE MATERIALS TETRAHEDRON

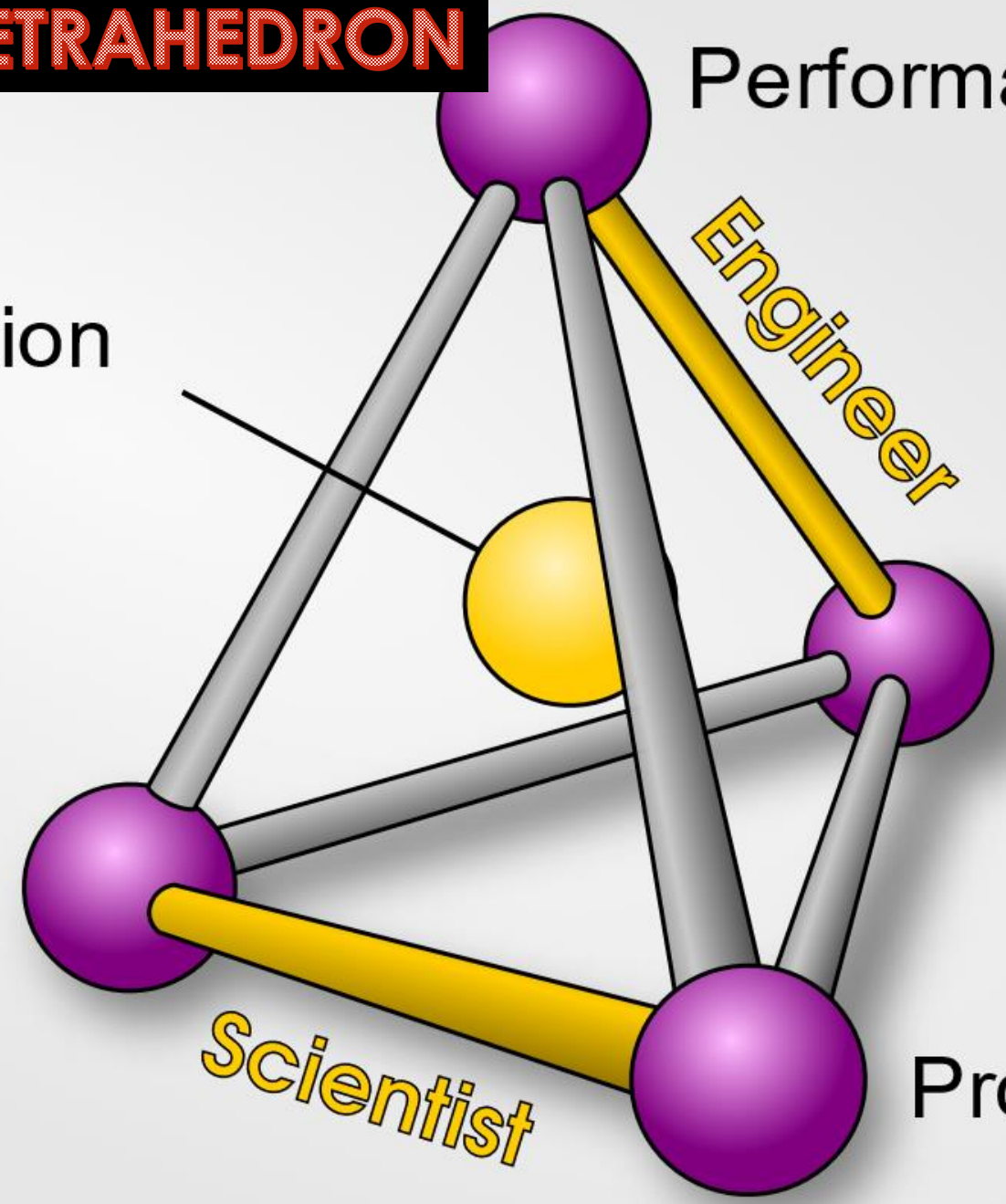
Characterization

Performance

Processing

Structure

Properties

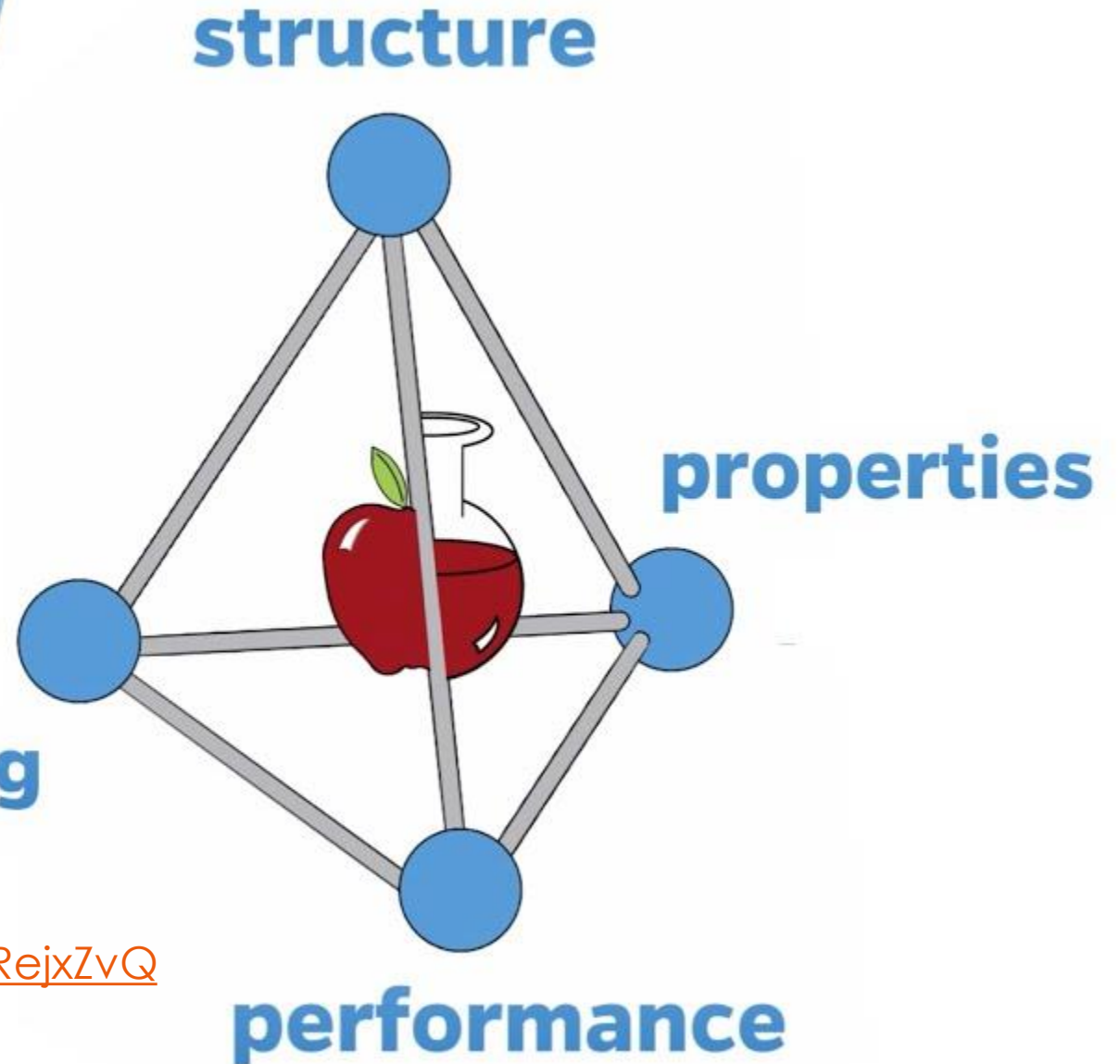


- **Performance** is how good a material is. Can it be used as landing gear? How about as an insulator? A material's performance is tied to a combination of separate properties.
- **Properties** are macroscopic things about a material that you can measure—hardness, elasticity, thermal conductivity, electrical conductivity, density, coefficient of friction, etc. Properties are determined by a material's structure.
- **Structure** is the feature of a material operating on different length scales. Structures can be large enough to see with the naked eye, or as small as atomic spacing. Some examples of structures include pores, precipitates, grain boundaries, grain orientation, and crystal structure. Structure is often influenced by processing.
- **Processing** refers to the steps needed to create a material. This often means the final steps to create a material—for example, heat treating and quenching to influence grain size—but it can even include mining raw ore and converting it into a more useful state.

All 4 of these points interact, which is why the tool is typically visualized as a tetrahedron, with edges connecting each side.

what is materials science?

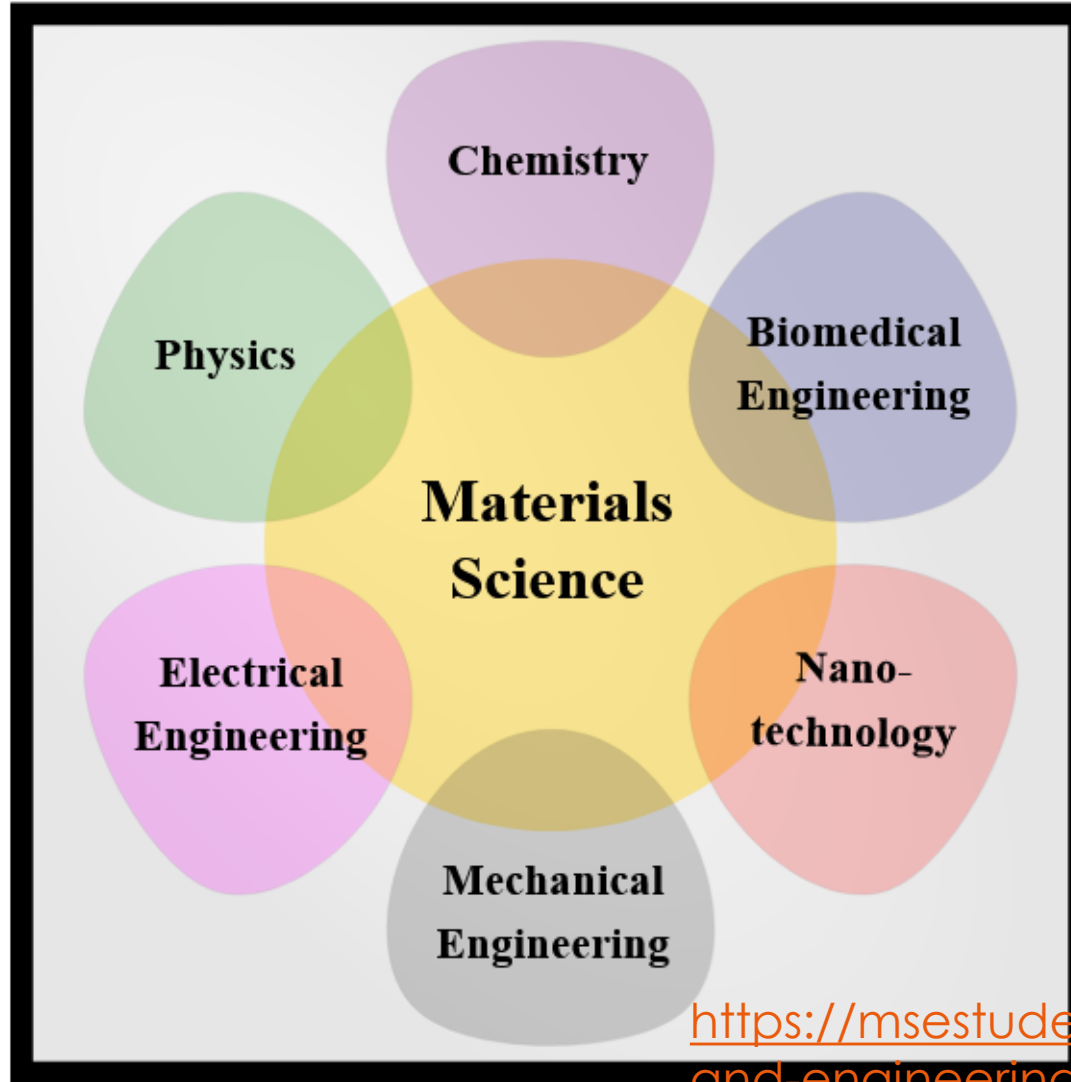
processing



<https://www.youtube.com/watch?v=wVCMRejxZvQ>

It's also important to discuss what materials science is within the context of modern STEM fields.

Materials science, while critical for modern technological advancement, is not well known.



<https://mstudent.com/what-is-materials-science-and-engineering-the-definitive-explanation/>

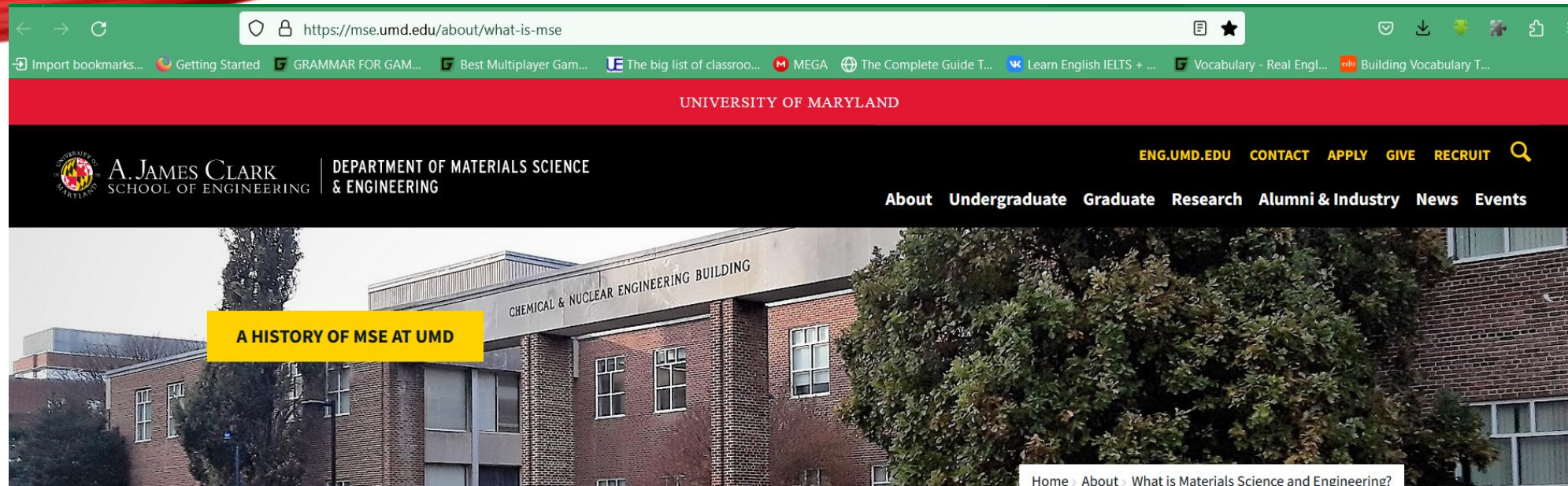


BONUS!

https://youtu.be/_cUEjPtVIIM

MATERIALS SCIENCE

<https://mse.umd.edu/about/what-is-mse>



What is Materials Science and Engineering?

Materials Science and Engineering (MSE) combines engineering, physics and chemistry principles to solve real-world problems associated with nanotechnology, biotechnology, information technology, energy, manufacturing and other

