

Have a noble metal content of $\geq 25\%$

ADA classification for alloy systems used for **metal-ceramic** restorations

- **High noble alloys** (*old term was precious metal*): $\geq 60\%$ noble metal content (**gold $\geq 40\%$**)
- **Noble alloys** (*old term was semiprecious metal*): $\geq 25\%$ noble metal content (**no gold required**)
- **Base metal alloys** (*old term was nonprecious metal*): $< 25\%$ noble metal content (**no gold required**)

Remember: Noble alloys (*gold, platinum, and palladium*) **do not** oxidize on casting. This feature is important in a metal substrate so that oxidation at the **metal-porcelain interface** can be controlled by the addition of trace elements to the metal (*silicon, indium, and iridium*).

Desirable properties of alloys for **metal-ceramic** restorations:

- **High yield strength:** minimizes permanent deformation under occlusal force and porcelain fracture due to framework deformation
- **High modulus of elasticity** (*stiffness*): minimizes flexure of long-span fixed bridges and porcelain fracture due to framework deformation.
- **Casting accuracy:** base metal alloys are less accurate than gold
- **Biological compatibility** (*for patient, dentist and lab technician*): can be a problem with Nickel and Beryllium in base metal alloys (*allergies*)
- **Corrosion resistance**
- The metal **coefficient of thermal expansion** should be higher than the porcelain to leave the porcelain in compression in a stronger state

Metal based on color or composition:

- **Yellow gold:** $> 60\%$ gold content.
- **White gold:** $> 50\%$ gold content.
- **Low (economy) gold** (*usually yellow*): $< 60\%$ gold (*42%-55%*)
- **High palladium:** white, mainly palladium, Gold (*2%*), little copper or cobalt
- **Silver-palladium:** white, silver (*55%-71%*), palladium for nobility and controlling tarnish (*25%-27%*), may or may not contain a little gold or copper.
- **Palladium-silver:** white, mainly palladium, silver up to 40%, .

Porcelain adheres to metal primarily by a **chemical bond**. A covalent bond is established by sharing O_2 with the elements present in the porcelain and the metal alloy. These elements include silicon dioxide (SiO_2) in the porcelain and oxidizing elements such as indium, tin, and gallium in the metal alloy.