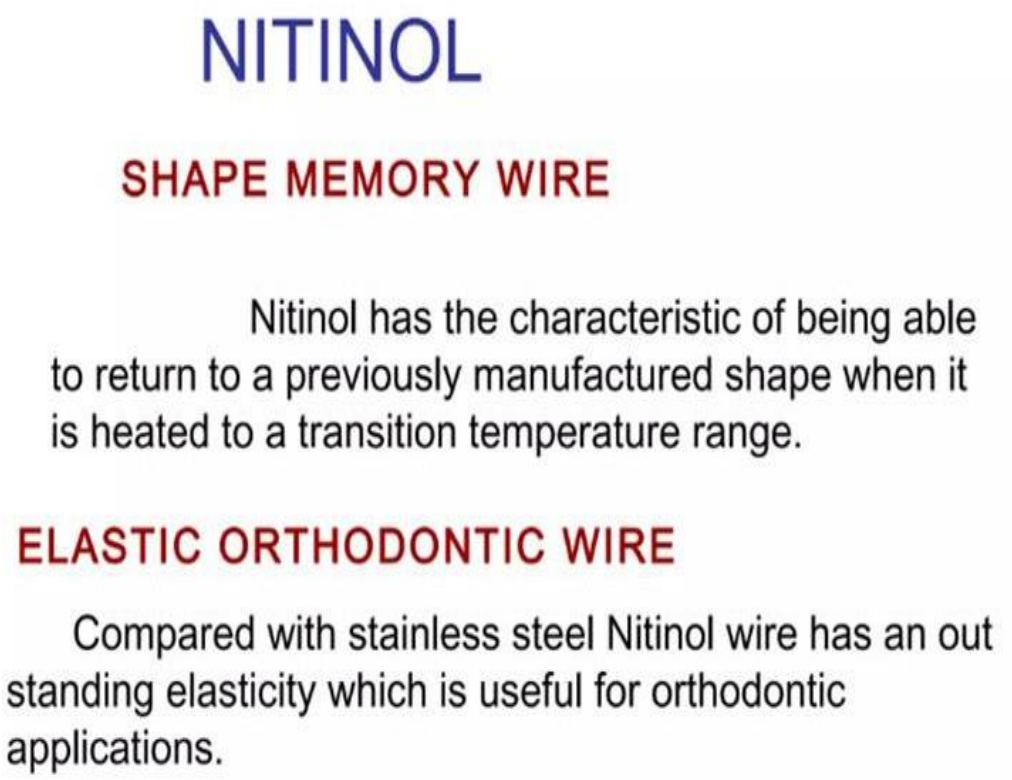
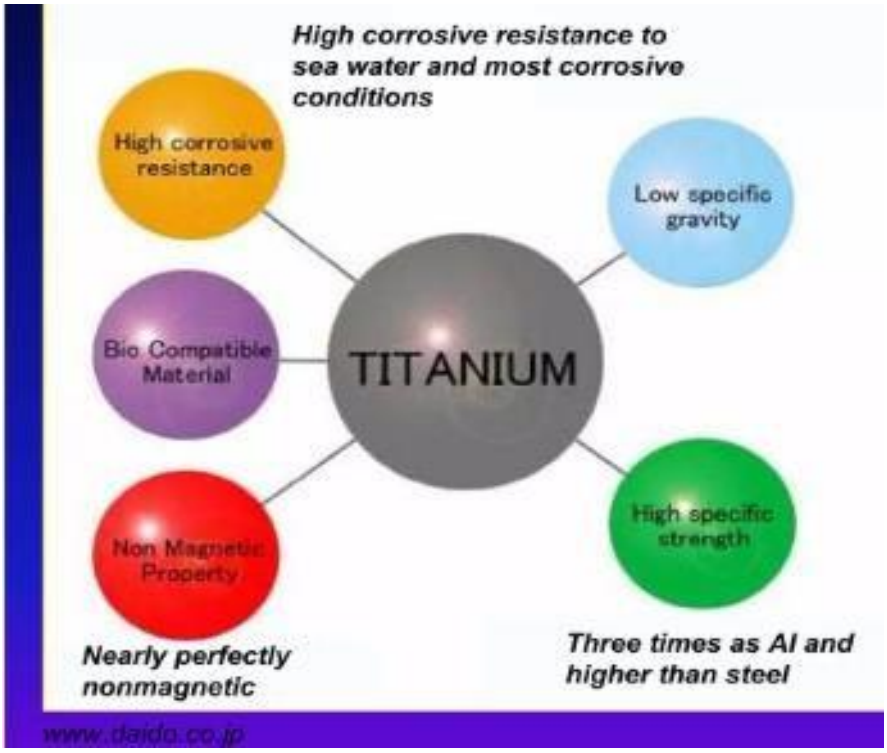
Titanium and Titanium alloy & Wrought alloys

Titanium and Titanium alloy:

Ti has resistance to electrochemical degradation, has good biological response, low weight, low density, low modulus, high strength. It forms very stable oxide layer. This oxide formation is the basis for the corrosion resistance and biocompatibility of Ti.

Shape Memory Alloys (SMAs): Alloy capacity to recover their original, pre-deformed shape after being subjected to significant mechanical deformation. This recovery is typically triggered by applying a specific external stimulus, most commonly heat. One of the most famous examples is the nitinol alloy.





Wrought alloys: alloys that are worked and adapted into prefabricated forms for use in dentistry described as wrought alloys. It may include precision attachment, wire in various cross section and shapes and also soldering alloys.

Wrought alloys are used in 2 ways:

1.Can be soldered to an existing appliance. For example: is a wrought wire clasp on a removable dental prosthesis framework.

2.Can be embedded into a cast framework (casting to the alloy). For example : as a precision attachment is cast to the retainer of a crown, bridge, or removable prosthesis.

Types of Dental Wires:

Wrought Nickel-Titanium Alloy Wire:

It is known as Nitinol. It was introducing as wire for orthodontic appliance in 1972. It is characterized by its high resiliency, limited formability.

The industrial alloy is 55% nickel, 45% titanium. A number of variations of Ni-Ti alloy have been developed in dentistry.

Mechanical properties of an orthodontic nickel-titanium alloy are compared with those of stainless steel; it has the lowest elastic modulus and yield strength but the highest spring back.

Wrought Beta-Titanium Alloy Wire:

A titanium – molybdenum alloy known as beta- titanium was introduced in 1979 as a wrought orthodontic wire.

It can be shaped easily, and the wires can be soldered and welded.
This kind of wire has the lower force magnitudes, a lower elastic modulus, higher spring back (maximum elastic deflection), a lower yield strength, and good ductility, weldability, and corrosion resistance.

Beta-titanium alloy has values of yield strength, modulus of elasticity, and springback intermediate to those of stainless steel and Nitinol. Its formability and weldability are advantages over Nitinol, and it has a larger working range than do stainless steel wires.