

Gum Metal®

Aim

To develop a new alloy that achieves both low elastic modulus and high strength, and capable of enormous elastic deformation, unprecedented in conventional materials.

Alloy design

Low elastic modulus \Rightarrow Assess the optimal combination of Ti and group Va elements

High-strength \Rightarrow Addition of group IVa elements and oxygen + cold working

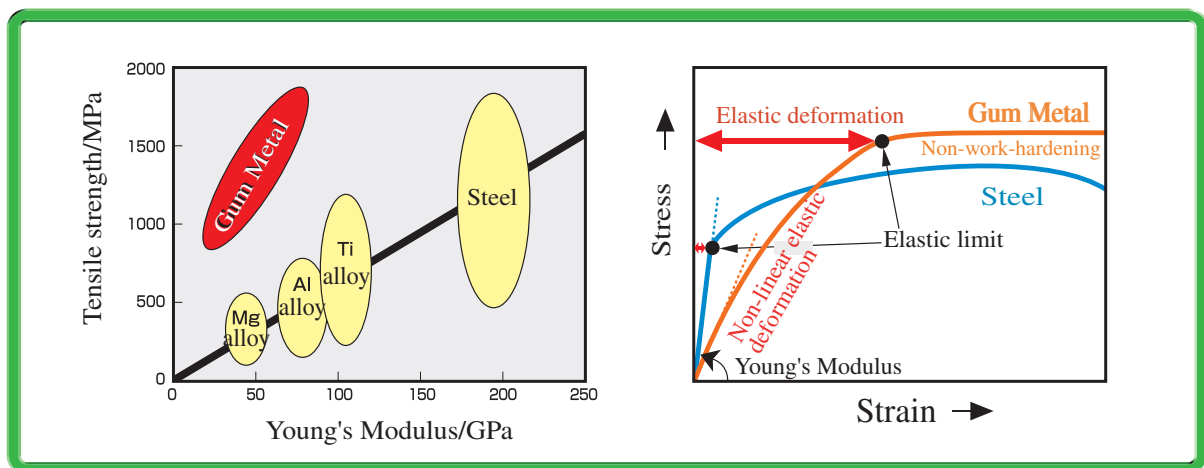


Development alloy: Ti + 25mol% (Ta, Nb, V) + (Zr, Hf, O)

Production method: Compacting of elemental powder \Rightarrow
Sintering \Rightarrow Hot working \Rightarrow Cold working

Characteristics

1. The world's first alloy that combines extremely low elastic modulus with extremely high strength, which was thought to have been impossible with metal materials.
2. Super-elasticity, capable of enormous elastic deformation exceeding 2.5%, displaying non-linear elastic deformation behavior (Hooke's Law does not hold true).
3. Super-plasticity that allows cold working of 99.9% or more without work-hardening.



Application

Automotive parts: Lightweight springs, Metal seals, Diaphragms, etc.
Other: Spectacles frames (commercialized), Medical equipment, Artificial bones, Sporting equipment such as golf clubs, and Ornamentation such as wrist watches, etc.