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Abstract

Shape Reversibility and Biocompatibility of Shape Memory Alloys

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Abstract:
A series of alloy systems called shape memory alloys exhibit a peculiar property called shape memory effect. This behaviour is initiated by cooling and deformation and performed thermally on heating and cooling after these treatments. These alloys recover original shapes on heating over a certain temperature after deformation in low temperature product phase region, and take place in class of smart materials, due to this property. Shape memory effect is based on a solid state phase transformation, martensitic transition which occurs in the material on cooling from high temperatures. Shape memory materials are very important and used in many fields from industry to medical applications such as medicine, pharmacy, and bioengineering. The choice of material as well as actuator and sensor to combine it with the host structure is very essential to develop main materials and structures. Therefore, actuators can be used as artificial muscles in human body. Muscles contract when activated, since they are attached to bones on two sides of a joint, the longitudinal shortening produces joint rotation. Bilateral motion requires pairs of muscles attached on opposite sides of a joint are required to produce. Shape memory alloys are also applied in medicine as fixation devices in orthopedic surgery and stent grafts where it gives the ability to adapt to the shape of certain blood vessels when exposed to body temperature. The biocompatibility of these alloys is one of the most important properties related to their biomedical applications as orthopedic implants, stent as well as orthodontic devices. Orthopedic and other medical applications tend to be concerned with thermal recovery and the associated forces generated during recovery. It should be pointed out that external devices are performed by heating them, not the temperature of the body. The force generated by this process accelerates healing, reducing the time of recovery.

Biography:

Dr Adiguzel graduated from Department of Physics, Ankara University, Turkey in 1974 and received PhD- degree from Dicle University, Diyarbakir-Turkey. He has studied at Surrey

University, Guildford, UK, as a post doctoral research scientist in 1986-1987, and studied on shape memory alloys. He worked as research assistant, 1975-80, at Dicle University and shifted to Firat University, Elazig, Turkey in 1980. He became professor in 1996, and he has already been working as professor. He published over 60 papers in international and national journals; He joined over 100 conferences and symposia in international and national level as participant, invited speaker or keynote speaker with contributions of oral or poster.

Recent Publications:

1. Crystallography of microstructural transitions in copper-based shape memory alloys.
2. Premartensitic and martensitic transitions and crystallography in copper based shape memory alloys.
3. Smart materials and the influence of atom sizes on martensite microstructures in copper-based shape memory alloys.
4. Crystallography of layered structures of martensite in copper-based shape memory alloys.

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