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Abstract:

The area of biomedical materials acts a significant role in manufacturing of a variety of biological artificial replacements which are very common in the modern times. At present time nitinol alloy is an engineering material used in the medical industry. Laser surface processing has been looked as a promising method to promote surface properties of materials without changing or affecting bulk properties in multiple applications. Pulsed laser deposition characterizes by high instantaneous deposition rate and thin film with low impurity incorporation. The aim of this work is characterizing the morphological properties and surface roughness of nitinol alloy due to the deposition of thin film of carbon. Carbon film shows corrosion resistance and chemical inertness at various applications in metallurgy, surface finishing and semiconductors. The maximum amount of carbon in weight percent is 13.805%and maximum roughness is 17.7nm at the room temperature , 1064nm,800mJ and 250 pulses. The best roughness is 0.902nm at 100℃ ,532nm,200mJ and 300 pulses.

Keywords: :nitinol, pulsed laser deposition, carbon, biomaterials, shape memory

alloy.

INTRODUCTION

Metallic materials can be approved as the most important engineering materials. They are used as biomaterials due to their superior thermal conductivity and mechanical properties. The major property required of a metal as biomaterial is that it does not illicit an adverse reaction when placed into services, that denotes to be a biocompatible material [1].

Shape memory alloys (SMAs) are a type of materials with the individual characteristics of Shape Memory Effect (SME) and Superelasticity (SE), according to the temperature range and applied load. These properties are due to a crystalline, diffusionless and reversible phase transformation between the phase stable at high temperature(austenite B2) and the phase stable at low temperature (martensiteB19) [2].A shape memory alloy has the ability to restore its original shape after deformation. Used in a variety of applications in industries ranging from consumerappliances to automotive to aerospace and medical, shape memory alloys have gained a strong foothold because they offer designers incredible flexibility compared to conventional materials or systems. In medical devices . [3]

Due to biocompatibility property, SMA used in orthodontic devices, endodontic files, broken

bones can have remedy with SMA[4]. Properties must be existing in biomaterials are absence of carcinogenicity, nonattendance of immunogenicity, absence of teratogenicity , and absence of toxicity[1].Nickel–titanium (nitinol) alloys play a main role due to their pseudo-elastic, shape memory, corrosion and biocompatibility properties[5].They are fundamentally used in the styling of medical devices for invasive surgery[6].NiTi alloys are used in the biomedical discipline with exceptional results especially in orthopedics and cardiovascular applications, neurosurgery, ophthalmology, urology[7].