

Pulsed Laser Coating of Bioceramic (HAp) and NiTi Nanoparticles on Metallic Implants

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This research deals with increasing the biocompatibility of the bio implants which have a global market valued more than \$94.1 billion . The surface of the metal alloys used for the bone implants need to be coated with bio compatible materials like HAp(Hydroxyapatite), graphene, etc. in order to promote the growth of cells(osteoblasts) on the surface of the implants. Various techniques like plasma spray coating, ion beam sputter coating, etc. have been used before to coat such materials on a substrate, however these have faced problems of coating quality. In order to perfect this coating, that is make it more durable and effective, pulsed laser sintering is performed on an alloy substrate with a gradient precoating of nano HAp mixed with nano Ti and nano Ni particles in different ratios. During laser sintering, the metal nanoparticles melt to entrap the HAp nanoparticles among them and the HAp particles being transparent to the laser wavelength used(1064nm) do not decompose and thus create a biocompatible surface and a strong adhesive bond with the surface of the substrate. This pulsed laser sintered substrate is analyzed under SEM and EDS to confirm the morphology and composition of the coating. Some other advantages of such a coating method are uniform coating, strong mechanical properties, high porosity and a durable coat on a bio-implant as proven before with scratch tests performed on coatings using Ti nanoparticles alone and with NiTi nanoparticles , the mechanical properties of the coating are expected to be enhanced.