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**A new double-layer hydroxyapatite/alumina-silica coated titanium implants using
plasma spray technique**

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Abstract

There have been several attempts to modify the surface characteristics of tissue engineering implants in order to stimulate specific characteristics. In this research, a single layer of hydroxyapatite (HA) and a new double-layer of HA/Al₂O₃-SiO₂ nanocomposites (SiO₂, 10, 20, 30 wt %) were deposited, respectively, on the surface of titanium implants by a plasma spray technique. The results indicated that the applied coating systems featured some specific characteristics on the surface such as higher surface roughness and hydrophilicity resulting in a better cellular response and apatite forming ability *in vitro*, compared to the bare titanium sample. In addition, among different applied coating, the double layer plasma-sprayed HA/Al₂O₃-20%wt SiO₂ coating has shown an enhanced cellular behavior and biocompatibility compared to the single-layer HA. In conclusion, the new bi-layer coatings could significantly affect the surface characteristics of the implants for better biological response without deteriorating the basic characteristics of the implants.

Keyword: Hydrophilicity; Surface roughness; Cell viability; Double layer coatings; Plasma spray

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