

Functional Thin Films and Coatings for Biomaterial Applications: Challenges and Opportunities

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Next generation surface modification techniques for titanium implants must exhibit excellent mechanical properties while also encouraging rapid osseointegration. Despite extensive research conducted in this area, up to now there is no implant available capable of resisting bone resorption while providing implant stability.

Physical (e.g. Pulsed Laser Deposition and Magnetron sputtering) and chemical (e.g. Sol-gel and Dip-coating) processes are solid-state deposition methods used to deposit dense metal coatings and have the potential for biomedical surface coatings.

This talk reports on the relationship between processing, microstructure characterization, and biological performance of biocompatible thin films (e.g. calcium phosphates, alumina, Poly(methyl methacrylate), etc.) on titanium implants. These combinations are proposed as a solution for linking the mechanical properties of the metallic material with the bioactive and biocompatible character of the ceramic and polymeric layers, leading to a better integration of the entire implant system with the newly remodelled bone.