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Titanium Based Porous Nanostructures for Biomedical Applications

S. Kh. Sadrnezhad*

Department of Materials Science and Engineering, Sharif University of Technology, Tehran, Iran

**sadrnezh@sharif.edu*

Current focus on radical strategies for bioactive porous scaffolds has opened new frontiers relating implantation, restoration, maintenance and improvement of hard and soft tissue and organs. Replacement potentials in nanostructured alloys and composites for bone, cartilage, ligament, skin, nerve, tissue and tendons is attractive to engineers and scientists for opening many new gates of thoughtful innovations. Novel technologies for construction of unique geometries, designs and shapes for nutrient loading, targeted doping and controlled drug release are in a wide horizon to emerge. In this paper, different procedures for production of bone-like scaffolds of different geometries and smartness are reviewed with consideration of their application for tooth-root fixation. The progressions consist of diverse compact-sintering, surface modifying and drug loading techniques. Adjustment of shape, size, pore geometry and void percentages are deliberated for bone growth progression. Tuning of transformation conditions towards required body tissue arouse is well-thought-out in specific on-going examinations. Enough strain recovery with excellent shape memory effects and self-fixation capability are occasionally observed. In spite of porosity presence, general corrosion and pitting behavior of the fabricated scaffolds fit in an acceptable level for most biomedical applications.

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