

Surface Engineering of Titanium for Excellent Cell Material Interactions

Dr. Srimala Sreekantan

School of Materials and Mineral Resources Engineering, Universiti Sains Malaysia, Engineering Campus, 14300

Nibong Tebal, Malaysia

Office No: +60 (4) 599 5255, Handphone No.: 012 5222674, EMAIL: srimala@eng.usm.my

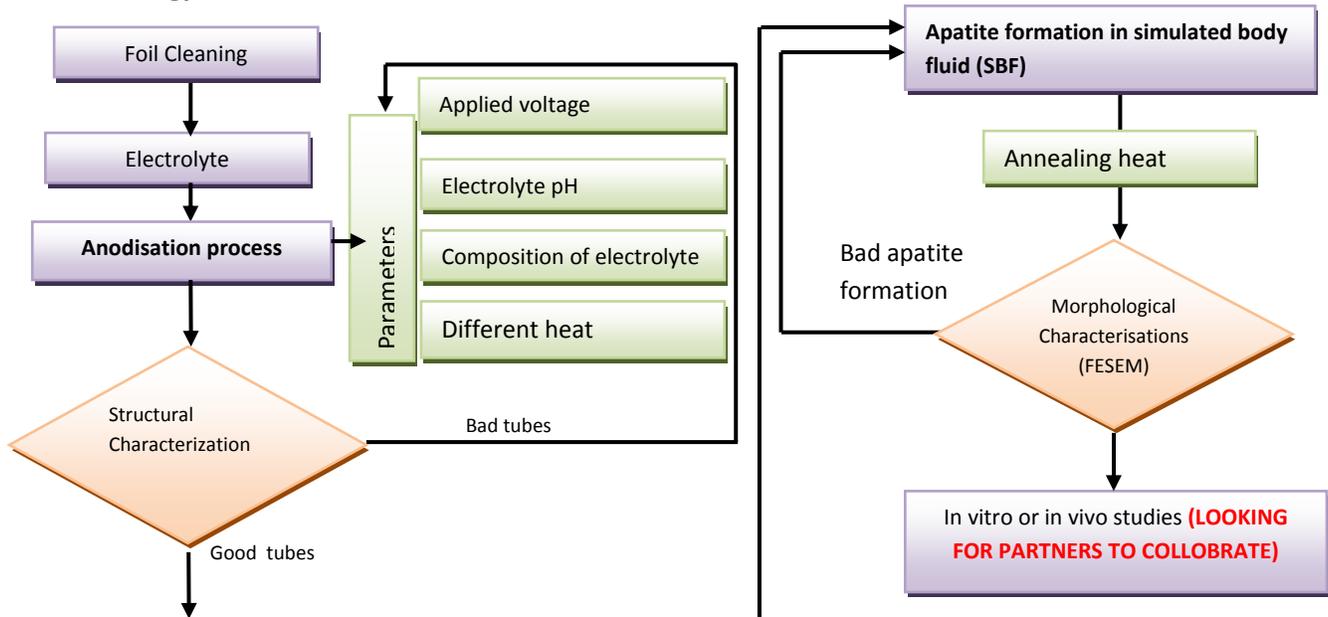
Description of the project:

Clinical application of Zr as an implant materials often fails because of the implant surfaces lack of desirable bioactive properties and thus do not support new bone growth leading to insufficient bonding. Therefore surface modification of Zr is still required and need to be investigated. Recently, in vitro study of osteoblasts on Zr coated with bioceramic layers such HA and β -TCP have been reported to enhance cell adhesion and proliferation. The fatal drawback of these currently available coating is that such a layer is composed of smooth, dense and continuous structure which tends to fail due to fracture or delamination at the interface between implant. It would thus be desirable if the interface is bonded with an improved and integrated structure, for example with a interlocked configuration with a large adhesion area and less continuous layer to avoid delamination and minimize interface stress. Therefore in this work, we have proposed on engineering the architecture of the Zr implant surface to form one dimensional (1D) nanotubular ZrO_2 to accelerate the cell interaction and cell growth onto the surface.

Objectives

1. To investigate the effect of electrochemical parameter on the formation of 1D nanotubular ZrO_2 bioactive layer.
2. To investigate in vitro cell-materials interactions using osteoblast cells on 1D nanotubular ZrO_2 bioactive layer
3. To study the correlation within surface properties (surface chemistry, surface energy, surface charges, surface structure) and the cell interaction

Methodology



Outcome:

- Improved implant materials, Research publication, Networking and Linkages, PhD and MSc students