Biomimetic Mineralization on Nano-rough Ti Surface Covalently-functionalized with Statherin-derived Recombinant Biopolymers

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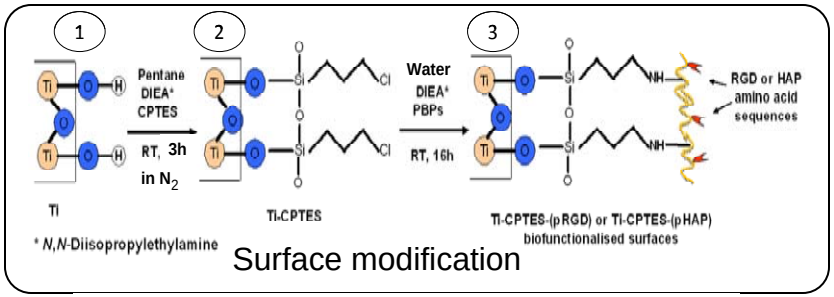
NNIN Facility utilized: CharFac's JEOL6500

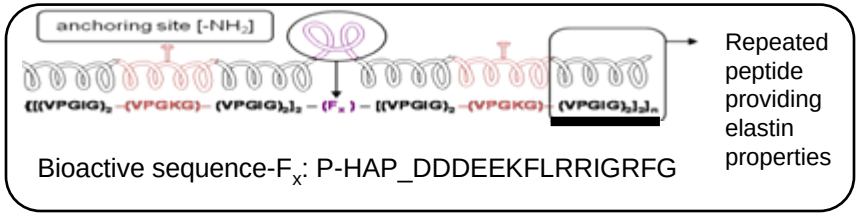
A biomimetic strategy for modifying the surface of dental implants by obtaining osseo-conductive interfaces

- Titanium surface was biofunctionalized with bone minerals by using bioactive synthetic polymer in order to accelerate osseointegration
- Fabricate nanoscale topography on titanium surface by alkyl treatment
- Develop organic/inorganic hybrid coatings on dental implants to mimic natural bone



Surface modification

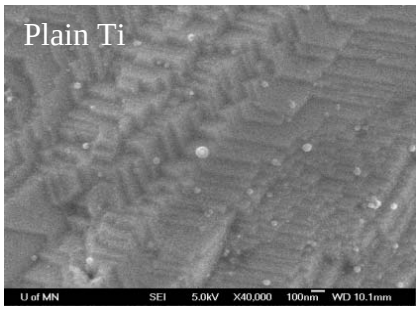
Statherin-derived Recombinant Biopolymers

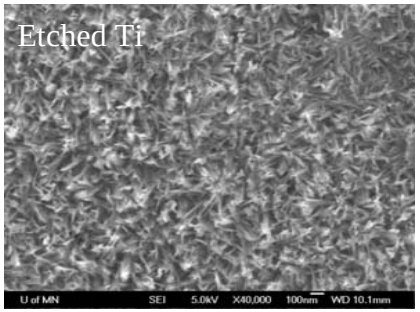


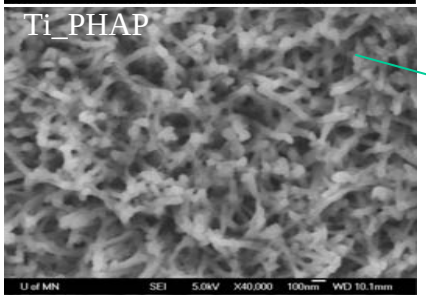
Bioactive sequence-F_x: P-HAP_DDDEEKFLRRIGRFG

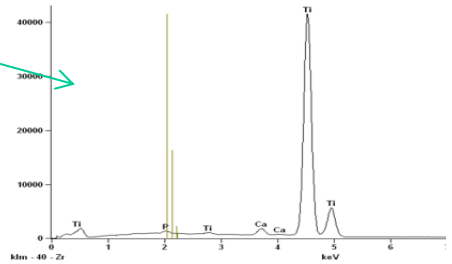
MAJOR OBSERVATIONS

- Alkyl treatment made the surface of titanium with nano-structural morphology (etched Ti). Calcium phosphate minerals grew on the surface of titanium anchored with statherin-derived biopolymers preserving the nano-rough topography as seen in Ti-PHAP sample from SEM and EDS showed Ca and P peaks.
- The resulted titanium with nano-textural surface with the incorporation of calcium phosphate minerals is a promising candidate for dental implants to provide biological stimuli for bone regeneration.
- The structure and composition of the obtained layer of calcium phosphate is under investigation by TEM, XRD, FT-IR and XPS.









Publications

- Yuping Li, Jose C. Rodriguez-Cabello and Conrado Aparicio; Biomineralization of Nano-rough Titanium Surface Functionalized with Statherin-inspired Recombinant Biopolymers, Oral presentation, MRS conference, Spring 2011, accepted.