S1 Fig. Surface characterization of Ti substrates by SEM.  

A. Commercially pure Ti discs were produced by a rotary machine, which left the isotropic grooves.  

B. The machined surface was treated with double acid etching (DAE), which generated submicron levels of anisotropic rough surface.  

C. The discrete crystalline deposition (DCD) surface modification to the DAE surface created the less than 50% surface coverage of hydroxyapatite nanoparticles (2~10 nanometer).  

D. To eliminate the effect of surface topography and to evaluate the role of Ti chemistry, the machined Ti disc was polished until 600-grade.  

E. Prior to DAE-DCD surface treatment, Ti disc was treated with sand blasting (B), which gave rise to greater surface roughness at the submicron to micron levels.  

F. The B-DAE-DCD surface modification remained to contain hydroxyapatite nanoparticles up to 50% surface area. The machined surface Ti implant is used as dental implant. Clinically used dental implants are also available with DAE, DAE-DCD and B-DAE-DCD surfaces (Zimmer Biomet, Palm Beach Garden, FL).