

Towards smart functionalization of metallic biomaterials

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Metallic materials are commonly used in orthopaedic and dental implants. However, some major clinical concerns are still valid, namely bone resorption due to stress shielding, low tribocorrosion resistance (leading to the intense release of metallic ions and wear debris, with local and systemic harmful effects), and lack of bioactivity. This presentation will make an overview on the tribocorrosion behaviour of functionalized/multi-functionalized dense, porous, and composite structures tested under simulated body environments. This presentation will also introduce some concepts for bio-intelligent surfaces releasing antimicrobial agents only when microorganisms will adhere to the surface, and giving tribocorrosion resistance only when wear will exceed a certain limit.

Short bio:

Fatih Toptan graduated in Metallurgical and Materials Engineering Department from Yildiz Technical University (YTU) in 2002. He completed MSc and PhD degrees both in Materials Science at YTU in 2006 and 2011 respectively, working on wear-resistant metal matrix composites. During his PhD, he spent one year in University of Minho (UMinho) for exploring the wear, corrosion, and tribocorrosion behaviour of the metal matrix composites. After his PhD, he started his post-doc at UMinho, financed by a project through The Foundation for Science and Technology (FCT). Between 2013 and 2018, he worked as invited assistant professor at Mechanical Engineering Department of UMinho. He coordinated 3 international projects as a PI and participated in 8 projects as a researcher. He is the co-author of 58 scientific publications and he participated in 62 scientific communications for presenting results to the scientific community. Currently, he is working as Invited Scientist at Center for MicroElectroMechanics Systems (CMEMS), UMinho. He is also a collaborator of the Brazilian Branch of the Institute of Biomaterials, Tribocorrosion and Nanomedicine (IBTN/Br) that develops its activities in an international and interdisciplinary environment through the close collaboration with the USA (IBTN/USA).