

"Degradation of orthopaedic joint implants"
Joint Symposium (WP18 + TF medical implants)

Orthopaedic joint implants such as hip and knee replacements have become a well-established and widely applied surgical practice. The implantation of devices implies creating an interface between living tissues and engineering materials, which is exposed to the combined action of mechanical loads and corrosion. Tribo-corrosion, i.e. the combined action of corrosion and wear, has been demonstrated to be the involved degradation mechanism in joint implants and the use of tribocorrosion concepts are needed to avoid past recalls of some products from the market and major health issues. Besides some obvious failure cases, there are still numerous open questions related to the interaction between wear and electrochemical phenomena and the role of physiological environments of the human body on them. Other less documented consequences are intoxication and inflammation induced by metallic ion leaching and/or abrasion related to degradation of the medical implants or loss of device functionality. The symposium should allow on one side, having clinicians and tribologists presenting real cases and on the other side, corrosion experts presenting the state of the fundamental understanding based on optimized in vitro characterization methodologies. Interaction between the various technical/scientific fields (electrochemistry, biology, medicine, tribology, materials) concerned by this problem will be aimed at merging the involved factors, medical doctors, implant manufacturers and patients, towards safer orthopaedic joint implants.

Contributions in the following topical areas are especially welcomed:

- Permanent orthopaedic joint implant degradation, including issues related to particle and ion release
 - o Presentation of medical case studies
 - o In vivo studies and damage analyses on explants
 - o Tribocorrosion of coatings and materials for joint bearings.
 - o Presentation of advanced in-vitro characterization methodologies
 - o Related fretting and fatigue corrosion mechanisms
 - o Corrosion processes at joined (brazed/welded) and/or multimaterial interfaces

A more detailed understanding of the corrosion mechanisms is needed to achieve realistic lifetime **predictions** of implant degradation and to perform accurate risk and health assessments of existing and novel implant/device technologies. The final aim is patient safety/comfort improvement and to provide expert support to industry for patient-tailored implant/device design and reduce the increasing trouble shooting activities observed in the recent years.

Chair: Dr. Anna Igual Munoz, Ecole Polytechnique Fédérale Lausanne/CH
Linked to the WP18 Tribo-corrosion group and symposium

Co-organizers:

Dr. Patrik Schmutz, Empa Materials Science and Technology, Dübendorf/CH
Dr. Manel Rodriguez Ripoll, AC2T research GmbH, Wiener Neustadt/A

Expected duration: half a day

Expected audience: 35 - 50 attendees