Workshop: "Corrosion of medical implants and devices"

The electrochemical reactivity of metals and alloys in the physiological environments of the human body poses ultimate technological challenges for a broad range of biomedical applications, such as metallic implants, sensing components and medical instruments. In particular, degradation of metallic implants is often accelerated in confined geometries (e.g. crevices), as well as under dynamic loading conditions, leading to early failures. Implant fracture under dynamic loading conditions is an obvious case where corrosive attack cannot be tolerated and should be mitigated. Other less documented examples are intoxication and inflammation induced by metallic ion leaching and/or abrasion related to degradation of the medical implants or loss of devices functionality.

This workshop addresses the main materials, microstructural and geometrical design challenges in medical implants/devices with a focus on fundamental understanding and mitigation of the underlying corrosion phenomena.

Contributions in the following topical areas (but not restricted to) are especially welcomed:

- Permanent metallic implant degradation, including issues related to particle/ionic release
  - Localized, crevice and fatigue corrosion mechanisms
  - Tribocorrosion and coating degradation
  - Innovative characterization approaches

- Metallic or composite degradable implants
  - Degradation mechanisms from in vitro to in vivo
  - Surface treatments for temporary initial corrosion protection

- Personalized implants
  - Corrosion mechanisms of additive manufactured implants
  - Localized corrosion phenomena of laser-structured medical components
  - Patient's illness/condition specific implant surface functionalization and/or coatings
  - Corrosion processes at joined (brazed/welded) and/or multimaterial interfaces

- Medical instruments
  - Passivation, labelling and new sterilization/cleaning requirements

- Implanted devices and sensors lifetime in contact with physiological environments
  - Silicon corrosion in microfluidics systems
  - Oxide sensors stability

A more precise and detailed understanding of the underlying corrosion mechanisms is needed to achieve accurate/realistic lifetime predictions and to perform valid risk and health assessments of existing and novel implant/device technologies. The final aim is to improve patient safety/comfort and provide expert support to industry for custom-tailored implant/device design in order to reduce the ever-increasing trouble shouting of daily implant problematics.

Please submit your abstract online via www.eurocorr.org before January 19, 2021.

I am looking forward to your contribution and participation in EUROCORR 2021 “Materials science and advanced technologies for better corrosion protection” on September 19-23, 2021, in Budapest, Hungary.

Chairman: Dr. Patrik Schmutz, Empa Materials Science and Technology, Laboratory for "Joining Technologies and Corrosion", 8600 Dübendorf, Switzerland.

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Expected duration: 1 day

Expected audience: 40 attendees