

Special Issue: “ Tribocorrosion of dental materials”

Editorial

Tribocorrosion affects all walks of life from oil and gas conversion to bio-medical materials. Wear can interact with corrosion to enhance it or impede it; conversely, corrosion can enhance or impede wear. The understanding of the interactions between physical and chemical phenomena has been greatly assisted by electrochemical analysis of the interactions and microscopic techniques. In Dentistry, it is well recognized that erosion due to dissolution (a term Physicists use to denote wear) of enamel can result in tooth decay; however, the effects of the oral environment, i.e. pH levels, electrochemical potential and any interactions due to the forces involved in chewing are not well understood. This special issue includes a range of investigations on the fundamentals of wear-corrosion interactions involved in simulated oral environments, including candidate dental implant and veneer materials.

The issue commences with a fundamental study of Titanium implants and this is followed by an analysis of the behaviour of commonly used temporomandibular devices in a synovial fluid-like environment. The analysis of tribocorrosion mechanisms of Ti6Al4V biomedical alloys in artificial saliva with different pHs is addressed and is followed by a paper on fretting wear, on Hydroxyapatite-Titanium Composites in simulated body fluid, supplemented with protein (Bovine Serum Albumin). The effects of acid treatments on tooth enamel, and as a surface engineering technique for dental implants, are investigated in two further contributions. An analysis of the physiological parameters of intraoral wear is addressed and this is followed by a study of candidate dental materials in common beverages such as tea and coffee with varying acidity and viscosity and the use of wear maps to identify the safety zones for prediction of material degradation in such conditions.

Hence, the special issue consists of a range of tribocorrosion contributions involving many aspects of dental tribocorrosion, from analysis of physiological approaches and tissue engineering to study of the effects of the environments encountered in clinical practice and management which lead to tooth decay. A wide range of analytical techniques and tribocorrosion experimental approaches is used to simulate, assess and model the synergistic interactions of wear and corrosion, many of them leading to new insights. Hopefully, it will lead to increased awareness of tribocorrosion phenomena for researchers and dental clinicians alike and “food for thought” for further studies in this field!

Guest Editors

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