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Borosilicate glasses in search of tissue regeneration

Maria Helena V. Fernandes [1,2,3]
[1]*Department of Materials and Ceramic Engineering,*
[2]*CICECO - Aveiro Institute of Materials (CICECO/UA)*
University of Aveiro, 3810-193 Aveiro, Portugal
[3]*The Discoveries Centre for Regenerative and Precision Medicine,*
Headquarters at University of Minho, Avepark, 4805-017 Barco, Guimarães, Portugal

Among the various materials with potential to restore nonfunctional parts of the human body glasses firstly appeared as privileged solutions as a consequence of their biocompatibility, bioactivity and ability to bond to hard and soft tissues. Over the last years, due to remarkable advances in the fields of molecular biology, materials engineering and biotechnology, all supported by powerful analytical and image scientific equipment, a panoply of new versatilities of glasses in their relationship with living systems has come to light.

A number of glass compositions has shown striking stimulatory effects on tissue regeneration, including osteogenesis, angiogenesis, antibacterial and anti-inflammatory activity. These achievements are attributed to strategic ionic species released from the glass network into the biological environment at rates that depend on both glass composition and structure.

This talk will give a general outlook of our work on different glass compositions and glass-containing biomaterials prepared by several processing technologies. Relevance will be given to structural characterization of the glasses, either used as single phase materials or as fillers of FDA-approved polymers, such as PCL.