Structure Property Relationships in OxyHalide Bioactive Glasses

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Abstract

Bioactive glasses were invented by Larry Hench. These glasses degrade in body fluids releasing Ca2+, PO43- ions and form an "apatite like phase" similar to bone and tooth mineral. They are used as bone substitutes, for treating periodontal disease and for re-mineralizing toothpastes such as Sensodyne® Repair and Protect for treating dentine hypersensitivity.

Composition-structure-property relationships in Bioactive Glasses will be discussed with an emphasis on the importance of glass network connectivity. The structural role of phosphate, soda and halogens including fluorine and chlorine in bioactive glasses will be reviewed and discussed in relation to their influence on physical properties; glass transition temperature, hardness, density and refractive index. In addition the dissolution behavior and phases formed upon immersion will be discussed.

It will then be shown how this understanding can be used to design glasses with different hardness values for air abrasives, fluoride releasing re-mineralizing hypersensitivity toothpastes, bioactive glass based dental fillings and adhesives.

A specific focus of the talk will be the development of BioMinF® toothpaste based on a fluoride containing bioactive glass launched by BioMin Technologies Ltd www.biomin.co.uk

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