

## **From Concept to Patient - Biomaterials Solutions to Tissue Regeneration”**

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Advances in regenerative medicine are critically dependent on the innovation of second-generation biomaterials, which are favorably bioactive, rather than simply bioinert in a given in vivo situation, through control of the biological processes in adjacent tissues.

Ronald Furlong's seminal development of a hydroxyapatite coated hip prosthesis for "cementless" fixation provided an early demonstration of the efficacy of this approach. Hence, appropriately for this Lecture, three other developments are considered in which novel biomaterials involving hydroxyapatite have been translated from laboratory concepts to clinical applications. First, the innovation of a hydroxyapatite-polyethylene composite as a bone analogue, through to its application as the preferred global solution for middle-ear prostheses. Second, the development of a silicon-substituted calcium phosphate, which enhances rapid and ordered bone remodeling as a bone-graft substitute, and is now in clinical application for spinal fusion. Third, a controlled collagen-glycosaminoglycan-calcium phosphate system, which allows a generic approach to cartilage repair. It is concluded that such mimicking of biological structures provides the basis for biomedical devices which empower tissue regeneration.

### **About Professor William Bonfield**

Professor William Bonfield is Emeritus Professor of Medical Materials in the University of Cambridge. He is internationally recognised for his pioneering research contributions to biomaterials for medical devices, with awards including the Prince Philip Gold Medal, the Royal Society Armourers and Brasiers Company Medal, the Kelvin Medal, the Institute of Materials Griffiths Medal and Chapman Medal, the European Society for Biomaterials George Winter Award, the Japanese Society for Biomaterials Medal, the UK Society for Biomaterials President's Prize and the Acta Metallurgica H. H. Holloman Award. Professor Bonfield has been elected both as a Fellow of the Royal Society and a Fellow of the Royal Academy of Engineering. In Cambridge, he established the Cambridge Centre for Medical Materials and the Pfizer Institute of Pharmaceutical Materials Science, while in his previous role at Queen Mary College, University of London, he founded the Interdisciplinary Research Centre in Biomedical Materials, which was the first of its kind in the U.K. Professor Bonfield has published over 400 research papers and was a Founder, and is a Non-Executive Director, of two companies, ApaTech Ltd. and OrthoMimetics Ltd. A distinguished Editor, he is currently Editor of Journal of the Royal Society-Interface, which aims to provide a bridge between the physical and life sciences. In 1998, Professor Bonfield was appointed Commander of the British Empire by the Queen for his services to health care and materials science.