Titanium bioimplant scaffolds
- stretching the limits through Superplastic Prosthetic Forming

Dr. Richard V. Curtis PhD, DIC, FIMMM, CEng, CSci, FADM

Senior Lecturer, Biomaterials & Biomimetics, King's College London, UK

Abstract

The field of Biomaterials has been evolving at an incredible rate in recent years as the perceived requirement of implant materials that are inert has been replaced with the demand that the material should interact with its host encouraging an appropriate response.

This response is not just specific to the material in the cell culture experiment but depends upon many other factors including processing, surface modification and the performance of the device or prosthesis in service.

One novel feature of the Superplastic Prosthetic Forming is the ability to fabricate complex implant shapes using biocompatible titanium alloys. However, at the same time as this complex shape is being produced, there is an opportunity to make changes to the surface chemistry resulting in a surface that elicits an even better host response for forming bone. Furthermore, what is just as exciting about this behaviour is the low cost associated with the use of these ceramic die materials from which the titanium material derives its shape.

In the future, the nature of Superplastic Prosthetic Forming could be revolutionised by the use of lasers throughout the forming cycle. The potential to produce highly clean implants with tailored surfaces using transparent ceramic dies could become reality in the near future.

Biography

Dr. Richard Curtis heads the Superplastic Prosthetic Forming and scanning research Facilities within Kings College London which are an integral part of the tissue engineering research effort. Richard Curtis is currently Chair of the Superplasticity Committee of the Institute of Materials, Minerals and Mining. He is also a member of the Board of the Academy of Dental Materials and on the Editorial Board of Dental Materials, the official journal publication of the Academy with a world-wide circulation and impact. His research interest includes development of forming tools for superplastic deformation using novel low-cost ceramic dies, development of optimized fit-for-purpose scaffolds through suitable chemical interactions between die and component during the shaping process, maxillofacial technology, and characterising the effect of cyclic load on dental implant assemblies using torque signature analysis.