Editorial

As chairmen of the 19th Conference of the European Society for Biomaterials, it is our pleasure to write this editorial to introduce this collection of papers, selected by referees from approximately 850 abstracts accepted for the Conference.

The 19th ESB conference, incorporating the 4th Young Scientists' Forum, took place in Sorrento, Italy from 11th to 15th September 2005. It attracted almost 800 participants, the highest number in ESB conference history. The scientific programme included 54 sessions, comprising 330 oral presentations and 500 posters. This shows the great activity of the research groups in biomaterials—from over 300 institutions and 42 countries worldwide—which were represented at this conference. Two sessions were jointly organized, in co-operation with the European Tissue Engineering Society (ETES) and with the European Society of Biomechanics (ESB). This highlighted the enormous progress in biomaterials science and technology, and reaffirmed the interdisciplinary and multidisciplinary nature of the field and the growth of inter-sectorial activities.

The needs and development of the last generation of biomaterials science have progressed from inert materials and related biological response to the realm of biomimetic and bioactive materials. These are variously able to stimulate specific cellular responses at the molecular level, or able to stimulate the body to activate inherent healing mechanisms, so providing the basis of tissue engineering and regenerative medicine strategies. Surface and molecular modifications of materials elicit specific interactions with cell integrins, thereby directing cell proliferation, differentiation, and extracellular matrix production and organization. These topics were addressed in the following oral and poster sessions: *Scaffolds, Tissue Engineering, Material-Cell Interaction, Tissue Repair/Regeneration, Calcium Phosphates, Surface Analysis, Hydrogels* and *Modelling/Rapid Prototyping.*

Cell-specific recognition factors incorporated onto the biomaterial surface, including the adhesive proteins, fibronectin or functional domains of ECM components, and polymer surfaces tailored with proteins that influence interactions with cells and tissue, were presented. There was also discussion of advances in the emerging area of bioactive molecules delivery (drugs, morphogenic proteins, growth factors and genes), as well as in materials design technology, which can lead to platforms able to control and guide the tissue regeneration process. These topics have been presented in the oral and poster session on *Degradable Polymer/Composite, Surface Modification, Protein Adsorption/Interactions, Drug Delivery*, and *Gene Delivery*.

Access to nanotechnology has offered a completely new perspective to the material scientists seeking to mimic the different types of extracellular matrices present in tissues. Techniques are now available which can demonstrably produce macromolecular structures of nanometre size, with a finely controlled atomic composition and architecture. These innovations were reflected at the conference, particularly in the four *Nano-Structure/Nano-Composites* sessions. The major focus on cells, including stem cell technology, was discussed in the sessions on *In vitro Biocompatibility* and *Material-Cell Interaction*s.

The sessions on *Bone Cements*, *Dental Materials* and *UHMWPE* concentrated on the development of new materials, and on techniques to improve their performance in these important applications. The *Biosensors* session provided a good illustration of the possibility of combining different technologies to monitor biomaterials and biological processes. The critical issues of *in vivo* biocompatibility and the developments in implant modelling were discussed in the session *In vivo Model/Biocompatibility*.

The ESB2005 conference programme is a clear demonstration of the great advances of biomaterials science in the areas of regenerative medicine and nano-medicine. This at once presents the young biomaterials scientist with many challenges, but also with the opportunity to acquire and apply multidisciplinary scientific knowledge of the highest level as his or her career progresses. The 4th Young Scientists' Forum provided an opportunity to discuss the key issues pertaining to education and networking in biomaterials science, Finally, we would like to invite you to read this Special Issue, which contains accounts of high quality research work performed by different groups worldwide. A wide variety of subjects, representing both fundamental research and application, are included. Its contents reflect the range of papers and posters, as well as the different themes, presented at the conference.

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