Preface

JBBTE is one of the few journals in the biomaterials and tissue engineering realm that publishes both research papers and review papers, and this journal spans the diverse but closely interrelated fields of Biomimetics, Biomaterials, and Tissue Engineering. This volume (Volume 16) comprises eight papers, all of which have a unique contribution to make to the interconnected fields of biomimetics, biomaterials, and tissue engineering.

Staudt, Böhme, and Baumgartner (Germany) present part 2 of their fundamental biomimetics study of the sandfish, a lizard capable of moving through desert sand in a swimming-like fashion. The epidermis of this lizard combines high abrasion resistance with low friction to sand outperforming steel, due to the chemical composition of the scales (glycosylated β-keratins). In this paper, the effect of glycans for friction reduction was investigated.

Ghezzo and Miao (Italy) present a detailed and comprehensive biomimetics review paper on biomimetically-inspired self-healing materials. A broad range of self-healing materials are presented, with a focus on composites with matrices that can self-heal the cracks by repairing the broken molecular links upon external heating.

York, Arida, Shah, Sethu, and Saunders (USA) present a fundamental biomimetics study of osteocytes. Osteocytes reside in bone and sense mechanical load applied to bone and relay that signal to osteoclasts and osteoblasts, thereby triggering bone remodelling. Thus they play a key role in bone atrophy from stress-shielding with metal implants. This study characterized the behaviour of osteocyte networks on silicone substrates, validating their framework for bone cell mechanotransduction studies using microsystems.

Xue, Li, and Wang (China) present a fundamental biomimetics study of leaf venation. A venation growing algorithm is proposed regarding venation development in leaves, and a mathematical model is developed for the reinforcement layout problem of a stiffened plate, the mechanical system that a venated leaf represents.

Gill, Munroe and McGoron (USA) present a biomaterials paper on biodegradable magnesium metal implants. Magnesisum is biodegradable and biocompatible, but its biodegradation rate needs to be reduced for in vivo use. The research involved investigating two novel mechanisms for reducing the biodegradation rate: 1) anodising the magnesium and 2) filling the magnesium matrix with hydroxyapatite powder, thereby making it a metal matrix composite.

Ahmad, Amer, and Majid (Iraq) present a biomaterials and biomimetics study on a starch/polystyrene biopolymer blend, a candidate biodegradable plastic for environmental sustainability. This study investigates the effect of gamma radiation on the thermal and chemical properties of the biopolymer.

Chan, Young, Tran, Miles, Ruys, and Boughton present a biomimetics and tissue engineering paper on knee meniscal repair using anatomically matched bioactive and biodegradable scaffolds which exhibit the structural and functional architecture of the native meniscus, and display mechanical properties approaching that of the native meniscus, and impart rotational stability.

Li, Li, Zhao, Zhang, and Ji (China) present a biomaterials and biomimetics study on bacterial biofilm formation on polyethylene, a topic of significant importance to catheter-related infections in hospitals. It was demonstrated that an organic antibacterial agent was able to prevent a bacterial biofilms from forming on polyethylene while the inorganic antibacterial agent was not. Reasons for the differences were investigated.

Volume 16 is one of most biomimetically-focussed volumes published by JBBTE to date, and certainly one of the most fascinating collections of papers in the literature on biomimetics. I am sure you will find this collection of cutting edge papers as interesting and thought-provoking as I have, and as always in JBBTE, you will see science and engineering bridging the three inter-related disciplines of Biomimetics, Biomaterials, and Tissue Engineering.

Professor Andrew Ruys
Editor in Chief: JBBTE
December 2012