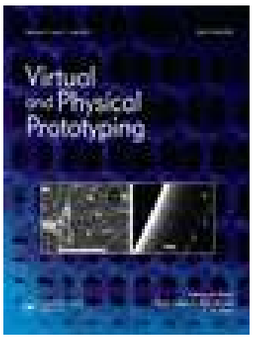

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Editorial

Paulo Bártolo & C. K. Chua

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Editorial

In recent years, we have witnessed major scientific breakthroughs in the field of Tissue Engineering (TE) and Regenerative Medicine (RM), most of them coming through Virtual and Rapid Prototyping technologies. Looking back to 2010, there was a huge increase regarding submission, publication and readership of *Virtual and Physical Prototyping*. More interestingly, the top five most downloaded papers are related with the emergent field of Biomanufacturing:

1. Biomanufacturing for tissue engineering: Present and future trends, Volume 4, Issue 4, December 2009, pages 203–216. Authors: P. J. Bártolo; C. K. Chua; H. A. Almeida; S. M. Chou; A. S. C. Lim. Downloads: 652.

2. New challenges for reverse engineering in facial treatments: How can the new 3D non-invasive surface measures support diagnoses and cures? Volume 5, Issue 1, March 2010, pages 3–12. Author: Luigi Maria Galantucci. Downloads: 576.

3. Reconstruction of subject-specific human femoral bone model with cortical porosity data using macro-CT. Volume 4, Issue 3, September 2009, pages 115–129. Authors: Ponnusamy Pandithevan; Gurunathan Saravana Kumar. Downloads: 484.

4. Indirect fabrication of microstructured chitosan-gelatin scaffolds using rapid prototyping. Volume 3, Issue 3, September 2008, pages 159–166. Authors: Jiankang He; Dichen Li; Yaxiong Liu; Haibo Gong; Bingheng Lu. Downloads: 394.

5. Morphology-controllable modeling approach for a porous scaffold structure in tissue engineering. Volume 4, Issue 3, September 2009, pages 149–163. Authors: Shengyong Cai; Juntong Xi. Downloads: 383.

In this issue of *Virtual and Physical Prototyping*, there are two papers on Rapid Manufacturing and two others on Virtual Prototyping.

In the first one, Mitchel *et al.* review the Electrospinning technique, introducing key process parameters, materials and applications. The author also proposes new routes for the application of Electrospinning for the production of 3D templates, as well to associate it with rapid manufacturing systems to create new hybrid systems.

The fundamentals and recent developments of Rapid Prototyping (RP) and Rapid Manufacturing are reviewed by Mannan *et al*. This author gives an overview of Rapid Prototyping and its potential applications in medicine and dentistry. Biological and mechanical properties of titanium and titanium alloys are also detailed. Key issues regarding the production of pre-surgical models, scaffolds, medical implants and prostheses are also addressed.

Major *et al.* stress the virtual and physical deformation behaviour of microcells with different microstructures and different material properties. The authors use a novel two component rapid prototyping system to manufacture heterogeneous polymer compounds and various microcell models. The deformation behaviour of the fabricated microcells and test specimen was subsequently characterised using the Digital Image Correlation (DIC) technique. Findings were then compared with microstructure simulation results to improve the accuracy of the material model used for the micromechanics simulation.

Karunakaran *et al.* examine the design and optimisation of the bullet nose of an aero-engine during a bird strike. A Finite Element Analysis (FEA) model was performed for the production of fine-tuned parts through Laser-Engineered Net-Shaping (LENS). Results highlight the realistic capacity of the FEA model.

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