DESIGN, FABRICATION AND MODELLING OF BIODEGRADABLE IMPLANTS

M. MARVI-MASHHADI*

* Helmholtz-Zentrum Hereon
Max-Planck Straße 1, 21502, Geesthacht, Germany
Mohammad.marvi@hereon.de

ABSTRACT

If large bone defects caused in consequence of high-energy impact or trauma, tumor, infection or osteo-degenerative diseases, are beyond a certain size, rebuilding and treatment could not be done by human body autonomously. Treatment of such a large defects is a major challenge in orthopedic surgeries, while available clinical solutions are still suffering from crucial limitations (Van Bael et al., 2012). Then, bone implants are considered to give sustainability to the bone structure and to buy some time for the body to complete the bone healing process. The ideal candidate for missing bone part substitute should show excellent biocompatibility as well as mechanical properties close to those of bone to ensure sufficient mechanical sustainability and avoid stress shielding. Porous design of scaffold implants offers a flexibility to match the stiffness (E) of implant to the host tissue to prevent implant loosening from bone resorption, i.e. stress shielding effect. Moreover, interconnected porous design of scaffold implant structure allows for bone ingrowth (Wen et al., 2001), and progressive degradation of implant material as the bone regenerates refrains from second surgery of implant removal.

This session is devoted to recent developments on the various aspects of biodegradable implants including:

- Design and application of biodegradable implants.
- Manufacturing of biodegradable implants (e.g. by additive manufacturing).
- Characterization of corrosion and mechanical degradation of biodegradable implants.
- Numerical modelling of corrosion and mechanical degradation of biodegradable implants.

Besides presentations of new results and new contributions to the understanding of biodegradable implants, this session will provide an opportunity to discuss and exchange ideas on the various topics related to biodegradable implants.

REFERENCES

- Van Bael, S., et al. Acta biomaterialia 8(7) (2012): 2824-2834.
- Wen, C., et al. Scripta materialia 45(10) (2001): 1147-1153.