

7<sup>th</sup> KMM-VIN Industrial Workshop (IW7)

**“Biomaterials: Key Technologies for Better Healthcare”**

27<sup>th</sup>-28<sup>th</sup> September 2017, Erlangen, Germany

Organized by:

Institute of Biomaterials, Friedrich-Alexander University of Erlangen-Nuremberg (FAU)

InnoPlant/Medical Valley Centre, FORM Laboratory-UK Erlangen

European Virtual Institute on Knowledge-Based Multifunctional Materials (KMM-VIN AISBL)

Chair: Aldo R. Boccaccini (FAU)

Co-Chairs: Heike Walles (University of Würzburg)

Stefan M. Sesselmann (FAU)

## Objectives

The goal of this workshop is to bring together experts working in the broad area of biomedical materials both in industry and academia, covering topics related to design, fabrication, characterisation and applications of a wide variety of biomaterials. Materials science and technological aspects, cell biology and in vivo evaluation of new biomaterials as well as analysis of the performance of established biomedical materials in clinical applications will be discussed. In addition, contributions cover advanced concepts of tissue engineering and regenerative medicine, including biofabrication approaches, controlled drug delivery systems and biomaterials models for in vitro screening and for cancer research and therapy. Topics of the keynote and contributed oral and poster presentations include:

- Biomaterials for bone and dental implants
- Biomaterials for cardiovascular applications
- Bone filling materials
- Scaffolds for hard and soft tissue engineering
- Bioactive and cell instructive materials
- Drug delivery carriers
- Biomedical Coatings and biomechanics
- Hydrogels and biofabrication approaches
- 3D biomaterial models for cancer research
- Clinical performance of biomaterials
- Biosensors and theranostics

# PROGRAMME

27<sup>th</sup> September 2017

**Registration and coffee** (12:00-13.00)

**Keynote lectures I** (13:00-15:00)

- Functionalization of surfaces and applications in healthcare surroundings – **Frank Heidenau** (BioCer Entwicklungs-GmbH)
- Opportunities and challenges of 3D printing in healthcare applications - **Tim Van Cleynenbreugel** (3D Systems)
- Requirement for Ceramic Implants for Hip Joint Prostheses – **Thomas Oberbach** (Mathys Medical AG)
- Soluble Phosphate Glasses and Composites as Key Biomaterials – **David M. Healy** (IDP Services Ltd)

**Coffee break** (15:00-15:30)

**Keynote lectures II** (15:30-16:30)

- Cell meets textiles – towards biohybride implants - **Stefan Jockenhövel** (RWTH Aachen University)
- LIPUS – Low Intensity Pulsed Ultrasound for bone healing purposes: Only a gimmick or a mechanism-based bone regenerative approach? - **Jochen Salber** (Universitätsklinikum Knappschaftskrankenhaus Bochum)

**Oral session I** (16:30-18:00)

*Surface modifications at the nanoscale for a better integration of implants to the hard and soft tissues and a reduced bacterial contamination* – **S. Spriano**, F. Baino, C. Balagna, M. Cazzola, A. Cochis, M. Ferraris, S. Ferraris, M. Miola, C. Ramskogler, L. Rimondini, A. Varesano, E. Vernè, C. Vineis, F. Warchomicka

*Site-directed Immobilization of BMP-2 onto collagen beads for bone regeneration* – **C. Siverino**, J. Nickel, H. Walles

*Electrospun multilayered scaffolds for interface tissue engineering applications* – **L. Liverani**, A.R. Boccaccini

*Influence of polymer film concentration on cytocompatibility and corrosion suppression of ZM21 magnesium alloy* – **A. Witecka**, A. Yamamoto, W. Świążkowski, M. Basista

*Hybrid materials for biomedical applications* – **J.C. Almeida**, I.M.M. Salvado, M.H.V. Fernandes

*Single cell analysis for studying tumor heterogeneity* – L. Hoene, A. Schwab, B. Fabry, M. Théry, A.R. Boccaccini, **A. Leal-Egana**

**Technical break** (18:00-18:15)

Short oral presentations (18:15-19:15)

1. *Exploiting piezoelectric polymeric platforms for neuronal tissue engineering* – **M. Fernandes**, N. Barroca, A. Marote, A. Almeida, S.I. Vieira, O. da Cruz e Silva, P.M. Vilarinho
2. *Personalised 3D-printed smart eyeglasses for physiological monitoring* – **O. Amft**, R. Zhang, F. Wahl
3. *Stem cell labeling with iron oxide nanoparticles in a 3D environment* – **M. Steinke**, T. Kilian, C. Grüttner, S. Hackenberg, F. Fidler, K. Schütze, H. Walles
4. *Wedge-shape compression of MSC-laden Col I gel for meniscus tissue engineering* – **A. Kremer**, J. Reboredo, H. Walles
5. *Development of bioactive bioglass scaffolds coated with iron-loaded hydroxyapatite nanocomposites as potential biomaterials for bone tissue repair* – **M.L. Dittler**, M.C. Gonzalez, A.R. Boccaccini
6. *Development and characterization of hybrid hydrogel based on alginate di-aldehyde, gelatin and silk fibroin for tissue engineering applications* – **S. Reakasame**, A.R. Boccaccini
7. *Functional polyelectrolyte coatings in prevention of medical devices from bacterial colonization* – **A. Mzyk**, J. Straub, M. Riool, L. de Boer, R. Major, S.J. Zaat
8. *Electrophoretic deposition of gentamicin loaded chitosan/gelatin/bioactive glass composite coatings on PEEK/bioactive glass layers: A comprehensive study on in-vitro-bioactivity and antibacterial effect* – **M.A. Ur Rehman**, W.H. Goldmann, A.R. Boccaccini
9. *Tribocorrosion response of different multilayer TaN coatings in biological environments* – R. Bayón, **V. Sáenz de Viteri**, L. Mendizabal, J. Barriga, A. Igartua
10. *Pure titanium with enhanced properties applied to newly developed dental implant* – K. Sztwiertnia, J. Kawalko, **M. Bieda**, D. Wojtas, K. Wierzbowski, M. Wronski, W. Pachla, M. Kulczyk
11. *Development of a conductive, biomimetic, polymeric fiber mat for a bilayered cardiac patch* – **L. Vogt**, F. Ruther
12. *Cinnamon bark oil encapsulated poly ( $\epsilon$ -caprolactone) nanofiber mats for wound healing* – **I. Unalan**, A.R. Boccaccini
13. *Synthesis, characterisation and applications of ordered mesoporous silver doped bioactive glass* – **F.E. Ciraldo**, A.R. Boccaccini
14. *Electrophoretic deposition of zein/bioactive glass composites* – **L. Ramos-Rivera**, N. Meyer, L. Tortoreto, A.R. Boccaccini
15. *Biodegradable zinc alloy with magnesium subjected to hydrostatic extrusion: evolution of microstructure, mechanical properties and corrosion behavior* – **A. Jarzębska**, M. Bieda, Ł. Rogal, R. Chulist, J. Guśpiel, M. Strąg, K. Sztwiertnia, W. Pachla, M. Kulczyk
16. *Preparation and characterization of mesoporous calcium doped silica coated TiO<sub>2</sub> scaffolds and their drug releasing behavior* – **A. Sengottuvelan**
17. *Applications of low energy electron beam technology for sterilization and surface modification of medical products* – **G. Gotzmann**
18. *The effect of chemical composition on viscoelastic properties of methylcellulose/agarose hydrogel* – **B. Niemczyk**, P. Sajkiewicz
19. *Magneto-Plasmonic nanoparticles for photothermal therapy* – **C. Multari**, M. Miola, F. Laviano, R. Gerbaldo, G. Pezzotti, D. Debellis, E. Vernè
20. *Evaluation of mechanical properties and biocompatibility of Gum Metal for implant applications* – **K. Golasiński**, E. Pieczyńska, R. Detsch, A.R. Boccaccini, N. Takesue

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**Keynote lectures III (9:00-11:00)**

- Cartilage tissue engineering with biomaterials developed for cartilage repair – **Gundula Schulze-Tanzil** (Institute for Anatomy, Klinikum Nürnberg Medical School)
- Recent multiscale mechanics contributions to bone tissue engineering – **Christian Hellmich** (TU Wien)
- Surgery and tissue engineering. What is the role of vascularization? – **Raymund Horch** (University Hospital Erlangen)
- Mimicking Bone Technology: Transforming implant surfaces from an artificial barrier into a smart implant body interface – **Dietmar Schaffarczyk** (stimOS GmbH)

**Coffee break (11:00-11:30)**

**Oral sessions II (11:30-13:00)**

*Ex vivo osteochondral explant model: Creation of standardized defects to investigate cartilage treatment strategies* – **A. Schwab**, A. Buß, S. Naczanski, H. Walles, F. Ehlicke

*3D bioprinting of chondrocyte-laden CELLINK hydrogels for patient-specific auricular cartilage reconstruction* – **S. Schwarz**, H. Martínez Ávila, N. Rotter, P. Gatenholm

*Surface patterning of a novel functionalized Poly-L-lactide polymer to improve its biocompatibility: Applications to Bioresorbable Vascular Stents (BVS)* – S. Pacharra, **R. Ortiz**, S. McMahon, W. Wang, J. Salber, I. Quintana

*Pressureless spark plasma-sintered Bioglass® 45S5 with enhanced mechanical properties and stress-induced new phase formation* – **L. Bertolla**, I. Dlouhý, P. Tatarko, A. Viani, A. Mahajan, Z. Chlup, M.J. Reece, A.R. Boccaccini

*Production of ATMPs under the regulatory requirements* – **Ch. Rücker**, M. Haddad-Weber, P. Bittendorf, H. Walles, O. Pullig

*3D investigation and visualization of biomaterials at micro- and nanoscale* – **J. Karbowniczek**, S. Metwally, P. Szewczyk, A. Gruszczyński, A. Kruk, A. Czyrska-Filemonowicz, U. Stachewicz

**KMM-VIN Forum and Networking (13:00-13:30)**

**Buffet lunch (13:30-14:30)**