

# Table of Contents

## Preface, Committees, Sponsors

## Chapter 1: Apatites and Calcium Phosphate

|                                                                                                                                                                                                                                |    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| <b>Value Added Bioceramics: A Review of the Developments and Progress in India</b><br>T.S. Sampath Kumar                                                                                                                       | 3  |
| <b>Transformation of Apatite Cement to B-Type Carbonate Apatite Using Different Atmosphere</b><br>A. Cahyanto, K. Tsuru and K. Ishikawa                                                                                        | 9  |
| <b>Nanocrystalline Apatites: A Versatile Functionalizable Platform for Biomedical Applications for Bone Engineering... and beyond</b><br>C. Drouet, C. Rey, C. Combes, S. Cazalbou, S. Sarda and D. Grossin                    | 14 |
| <b>Osteoconductivity and Bioresorption of an Interconnecting Porous Carbonate Apatite with Enhanced Mechanical Strength</b><br>N.X.T. Tram, M. Maruta, K. Tsuru, S. Matsuya and K. Ishikawa                                    | 23 |
| <b>Regulation of DCPD Formation on <math>\beta</math>-TCP Granular Surface by Exposing Different Concentration of Acidic Calcium Phosphate Solution</b><br>K.A. Shariff, K. Tsuru and K. Ishikawa                              | 27 |
| <b>Analysis on the Setting of Brushite Bone Cement after Storage in the Humid Environment</b><br>T.J. Chung and K.S. Oh                                                                                                        | 32 |
| <b>Conversion of Marine Structures to Calcium Phosphate Materials: Mechanisms of Conversion Using Two Different Phosphate Solutions</b><br>I.J. Macha, D. Grossin and B. Ben-Nissan                                            | 36 |
| <b>Fabrication of Bone-Like Apatite-Phosphatidylcholine Composite Thin Film by Biomimetic Method</b><br>H. Mizutani, T. Yabutsuka, S. Takai and T. Yao                                                                         | 40 |
| <b>Novel Bioceramic Production via Mechanochemical Conversion from Plate Limpet (<i>Tectura scutum</i>) - Shells</b><br>A.T. Inan, O. Gunduz, Y.M. Sahin, N. Ekren, S. Salman, J. Chou, B. Ben-Nissan, H. Gökçe and F.N. Oktar | 45 |
| <b>Production of Apatite from Snail Shells for Biomedical Engineering Applications</b><br>N. Ekren, O. Gunduz, S. Celik, B. Ayata, Y.M. Sahin, J. Chou, B. Ben-Nissan, S. Salman, H. Gökçe and F.N. Oktar                      | 51 |
| <b>Preparation of Porous <math>\alpha</math>-TCP Block by Fusion of DCPD Coated <math>\alpha</math>-TCP Spheres</b><br>T.I. Arifta, M.L. Munar, K. Tsuru and K. Ishikawa                                                       | 57 |
| <b>Can European Sea Bass (<i>Dicentrarchus labrax</i>) Scale Be a Good Candidate for Nano-Bioceramics Production?</b><br>Y.M. Sahin, O. Gunduz, A. Fica, N. Ekren, A. Tuna, A.T. Inan and F.N. Oktar                           | 60 |

## Chapter 2: Bioceramics in Dental Surgery and Orthodontics

|                                                                                                                                                                                          |    |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| <b>Adhesion Properties of an Apatite Film Deposited on Dentine Using Er:YAG Laser Ablation Method</b><br>E. Yamamoto, N. Kato, K. Yoshikawa, K. Yasuo, K. Yamamoto and S. Hontsu         | 69 |
| <b>Hardness Evaluation of Dental Composite with Ceramic Fillers</b><br>N. Djustiana, Z. Hasratiningsih, E. Karlina, R. Febrida, V. Takarini, A. Cahyanto, A. Hardiansyah and B. Sunendar | 74 |
| <b>Effects of Surface Properties of Montmorillonite for their Cytocompatibility</b><br>K. Nakanishi, S. Abe, S. Yamagata, Y. Yoshida and J. Iida                                         | 80 |
| <b>Synthesize and Characterization Zr-Al-Si Post through Eggshell Membrane Strengthening with PMMA Matrix</b><br>N.E. Putra, Y. Fendra, D. Nurdin and B.S. Purwasasmita                  | 85 |
| <b>Polymethylmethacrylate Composite Bone Cement Adding with Tetracalcium Phosphate</b><br>R.J. Chung, K.L. Ou and H.W. Liang                                                             | 89 |

|                                                                                                                                                                                                                                                                                               |     |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| <b>Basic Properties of PMMA Reinforced Using Ceramics Particles of <math>ZrO_2-Al_2O_3-SiO_2</math> Coated with Two Types of Coupling Agents</b><br>Z. Hasratiningsih, A. Cahyanto, V. Takarini, E. Karlina, N. Djustiana, R. Febrida, K. Usri, Y. Faza, A. Hardiansyah and B.S. Purwasasmita | 93  |
| <b>Overlaid Ultrathin Amorphous Calcium Phosphate Sheet Improves Dentinal Permeability Inhibition Rate</b><br>N. Kato, Y. Ido, E. Yamamoto, K. Yasuo, K. Yoshikawa and S. Hontsu                                                                                                              | 99  |
| <b>Application of Fluorine Containing Bioactive Glass Nanoparticles in Dentin Hypersensitivity Treatment</b><br>C.E. Camargos Lins, S.M. de Carvalho, A.A.R. de Oliveira and M. de Magalhães Pereira                                                                                          | 103 |
| <b>Inappropriate Toothbrushes Selection Alter Composite Dental Material Restoration Surface Roughness: A Preliminary Study</b><br>E. Oktaviana, R. Ardhani and H.D.K. Yulianto                                                                                                                | 108 |
| <b>Effect of Infiltration with Ferric Oxide Containing Glass on the Color and Mechanical Properties of Zirconia</b><br>S.W. Park, G.J. Oh, K.J. Jang, M.K. Ji, J.H. Kim, J.W. Kim, J.S. Ban, H.P. Lim, K.D. Yun, M.J. Kim and C. Park                                                         | 113 |

### **Chapter 3: Bioceramics in Practice of Scaffolds, Tissue Engineering and Implantation**

|                                                                                                                                                                                                                                                                                      |     |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| <b>Magnetite/Hydroxyapatite Composite Particles-Assisted Pore Alignment of Tilapia Fish Scale Collagen-Based Scaffold</b><br>V. Irawan, T. Sugiyama and T. Ikoma                                                                                                                     | 121 |
| <b>The Effect of Freeze-Thaw Treatment to the Properties of Gelatin-Carbonated Hydroxyapatite Membrane for Nerve Regeneration Scaffold</b><br>A. Patriati, R. Ardhani, H.D. Pranowo, E.G.R. Putra and I.D. Ana                                                                       | 129 |
| <b>Development of Bioactive PEEK by the Function of Apatite Nuclei</b><br>K. Fukushima, T. Yabutsuka, S. Takai and T. Yao                                                                                                                                                            | 145 |
| <b>Fabrication of Bioactive Stainless Steel by the Function of Apatite Nuclei</b><br>T. Yabutsuka, R. Karashima, S. Takai and T. Yao                                                                                                                                                 | 151 |
| <b>Increased Pre-Osteoblast Bioactivity on Ca-Modified Titanium</b><br>Sunarso, R. Toita, K. Tsuru and K. Ishikawa                                                                                                                                                                   | 157 |
| <b>Mesoporous Silica Coating on Rf-Sputtered Apatite/Titanium Substrate</b><br>Y. Yokogawa, M. Kitano and K. Hiroyasu                                                                                                                                                                | 161 |
| <b>Primary Stability of Uncemented Total Hip Stems with Different Ceramic and Titanium Surface Coatings</b><br>R. Dammer, A. Fritsche, H.D. Link, C. Zietz and R. Bader                                                                                                              | 165 |
| <b>Thin Degradable Coatings for Optimization of Osteointegration Associated with Simultaneous Infection Prophylaxis</b><br>A. Bernstein, N. Suedkamp, H.O. Mayr, R. Gadow, I. Arhire, A. Killinger and P. Krieg                                                                      | 171 |
| <b>The Balance between Bone Formation and Material Resorption in Unidirectional Porous <math>\beta</math>-Tricalcium Phosphate Implanted in a Rabbit Tibia</b><br>T. Makihara, M. Sakane, H. Noguchi and M. Yamazaki                                                                 | 177 |
| <b>Effects of Na Alginate in the Porosity of Scaffold Biphasic Calcium Phosphate/Alginate Composites</b><br>K. Dahlan, N.A. Nuzulia, S.T. Wahyudi and S. Utami                                                                                                                       | 183 |
| <b>Highly Porous <math>\beta</math>-TCP Block with Triple Pore Structure in Rat Subcutaneous Tissue and Sheep Iliac Critical Bone Defect</b><br>M. Murata, T. Akazawa, M.A. Kabir, Y. Minamida, M. Shakya, H. Nagayasu, K. Yamada, M. Ito, M. Sakamoto, T. Matsumoto and T. Nakajima | 187 |
| <b>Quantitative Estimation of Connectivity among Pores in the Hydroxyapatite Scaffold Prepared by Slip Casting with Porogen</b><br>M.C. Lee, T.J. Chung and K.S. Oh                                                                                                                  | 192 |
| <b>Mechanical Behavior of PCL Nanofibers</b><br>M.K. Keler, S. Daglilar, O. Gunduz, M. Yuksek, Y.M. Sahin, N. Ekren, F.N. Oktar and S. Salman                                                                                                                                        | 196 |

## Chapter 4: Cytocompatibility and Cytotoxicity of Bioceramics

|                                                                                                                                                                                                                                                           |     |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| <b>Human Mesenchymal Stem Cells Behavior on Synthetic Coral Scaffold</b><br>E.S. Mahanani, I. Bachtar and I.D. Ana                                                                                                                                        | 205 |
| <b><i>In Vivo</i> Evaluation of Strontium-Containing Nanostructured Carbonated Hydroxyapatite</b><br>G.M. Kammer, S.C. Sartoretto, R. Resende, M. Uzeda, J.R. Nascimento, A.T. Alves, J. Calasans-Maia, A.M. Rossi, J.M. Granjeiro and M.D. Calasans-Maia | 212 |
| <b><i>In Vivo</i> Evaluation of Zinc-Containing Nanostructured Carbonated Hydroxyapatite</b><br>S. Ribeiro, S.C. Sartoretto, R. Resende, M. Uzeda, A.T. Alves, S.A. Santos, G. Pesce, A.M. Rossi, J.M. Granjeiro, F. Miguel and M.D. Calasans-Maia        | 223 |
| <b>Studies on Connexin 43, a Gap-Junction Protein, in P19 Embryonal Carcinoma Cells after Culture on an Apatite Fiber Scaffold</b><br>N. Kanzawa, H. Takano, K. Yasuda, M. Takahara and M. Aizawa                                                         | 230 |
| <b>Cytocompatibility of Ceramic Nanoparticles to Various Types of Cells</b><br>S. Abe, N. Iwadera, M. Mutoh, T. Katsurayama, S. Morimoto, K. Nakanishi, T. Akasaka, S. Inoue, Y. Yawaka, J. Iida and Y. Yoshida                                           | 234 |
| <b>Hollow Shells Development and Characterization for Cells Carrying Purpose</b><br>T. Miramond, P. Borget, F. Moreau, B. Fellah and G. Daculsi                                                                                                           | 238 |

## Chapter 5: Drug Delivery Systems

|                                                                                                                                                                                                                                          |     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| <b>Bioceramic Drug Delivery System for Cancer Treatment and Regenerative Medicine</b><br>A. El-Ghannam                                                                                                                                   | 245 |
| <b>Preparation of Carbonated Apatite Membrane as Metronidazole Delivery System for Periodontal Application</b><br>R. Ardhani, Setyaningsih, O.A. Hafiyah and I.D. Ana                                                                    | 250 |
| <b>Enzyme Immobilization by Using Apatite Microcapsules with Magnetic Properties</b><br>T. Yabutsuka, S. Kumazawa, D. Hisashuku, H. Mizutani, K. Fukushima, S. Takai and T. Yao                                                          | 259 |
| <b>Interface Function and Cefazolin-Adsorption-Release Characteristics of Hydroxyapatite Granules Modified by Supersonic Treatment Techniques</b><br>T. Akazawa, M. Murata, Y. Minamida, M.A. Kabir, M. Ito, M. Sakamoto and T. Nakajima | 265 |
| <b>Hydroxyapatite/PLA Biocomposite Thin Films for Slow Drug Delivery of Antibiotics for the Treatment of Bone and Implant-Related Infections</b><br>I.J. Macha, B. Ben-Nissan, J. Santos, S. Cazalbou and B. Milthorpe                   | 271 |