

Table of Contents

Preface, Committees and Bioceramics Symposia

I. Biostable Ceramics and Tough Ceramics

Ceramics in THR Bearings: Behavior under Off-Normal Conditions C. Piconi, A.A. Porporati and R.M. Streicher	3
Apatite-Forming Ability of ZrO₂ Ceramics Enhanced by Sandblasting and Chemical Treatment and the Influence on Mechanical Properties M. Kolafiová, A. Nežiková, J. Kamprle, J. Strnad and Z. Strnad	8
Electrophoretic Deposition of Zirconia Multilayered Constructs F. Lützke, M. Maier, A. Urbanska, R. Zehbe, C. Fleck, W.D. Müller and C. Mochales	13
Characteristics of Low Temperature Degradation Free ZTA for Artificial Joint J. Ikeda, T. Murakami, T. Shimozono, R. Watanabe, M. Iwamoto and T. Nakanishi	18

II. Glasses and Glass-Ceramics

A Comparative Investigation on a Novel Bioactive Glass Synthesized via Sol-Gel Processing S.S. Seyedmomeni, M. Naeimi, M. Raz, J. Aghazadeh Mohandes and F. Moztarzadeh	25
Sol-Gel Synthesis and Characterization of SiO₂-CaO-P₂O₅-SrO Bioactive Glass: <i>In Vitro</i> Study S. Solgi, M. Shahrezaee, A. Zamanian, T.S. Jafarzadeh Kashi, M. Raz, K. Khoshroo and M. Tahriri	30
Combustion Synthesis of 58S Bioglass Using Sol-Gel Self-Propagating Combustion Method C.A. Bertran and O.V.M. Bueno	36
Spine-Ghost: A New Bioactive Cement for Vertebroplasty C. Vitale-Brovarone, L. Pontiroli, G. Novajra, I. Tcacencu, J.C. Reis and A. Manca	43

III. Calcium Phosphates

Transparent Hydroxyapatite Obtained through Spark Plasma Sintering: Optical and Mechanical Properties Z. Li and K.A. Khor	51
NMR Structural Characterization of Mg-Containing Nano-Apatite S. Hayakawa, T. Konishi, T. Yoshioka, E. Fujii and K. Kawabata	57
Evaluation of Sr- and/or Mg-Containing Hydroxyapatite Behavior in Simulated Body Fluid L. Stipniece, K. Salma-Ancane, A. Putnins and L. Berzina-Cimdina	61
Improving the Flexural Strength Test of Brushite Cement S. Altundal, K.A. Gross, C. Ohman and H. Engqvist	67
Biphasic Calcium Phosphate: Preferential Ionic Substitutions and Crystallographic Relationships at Grain Boundaries T. Miramond, T. Rouillon and G. Daculsi	73
Fabrication of α-Tricalcium Phosphate Ceramics through Two-Step Sintering I.Y. Kim, J. Wen and C. Ohtsuki	78
Calcium Phosphate-Loaded Strips, Plugs and Putties: Physico-Chemical Properties for Osteopromotion and Ease of Surgery T. Miramond, T. Galtier, G. Daculsi and P. Borget	83
Synthesis of Peroxyapatite by Hydrothermal Processing K. Gross, A. Jersova and A. Viksna	88
Synthesis of Tetracalcium Phosphate at Reduced Temperatures K. Gross and E. Rozite	93
Effect on Drying Conditions on Amorphous Calcium Phosphate A. Brangule and K. Gross	99

IV. Cements

Biocompatibility of Silver-Containing Calcium-Phosphate Cements with Anti-Bacterial Properties

Y. Shimizu, Y. Kawanobe, T. Konishi, N. Kanzawa, M. Honda and M. Aizawa 107

Preparation of α -Tricalcium Phosphate Powders Surface-Modified with Inositol Phosphate for Cement Fabrication

T. Konishi, M. Honda, T. Yoshioka, S. Hayakawa and M. Aizawa 113

The Effects of Nanoparticles of Silica and Alumina on Flow Ability and Compressive Strength of Cementitious Composites

A.S. Khorasani, H. Nurianian, A.A. Yuzbashi, S. Moghaddas, M. Raz and M. Tahriri 119

Effect of Particle Size on Carbonate Apatite Cement Properties Consisting of Calcite (or Vaterite) and Dicalcium Phosphate Anhydrous

A. Cahyanto, R. Toita, K. Tsuru and K. Ishikawa 128

V. Composites and Hybrid Materials

Bioceramic Production from Giant Purple Barnacle (*Megabalanus tintinnabulum*)

F.N. Oktar, H. Gokce, O. Gunduz, Y.M. Sahin, D. Agaogullari, I.G. Turner, L.S. Ozyegin and B. Ben-Nissan 137

Colour Stability of Self-Adhesive Flowable Composites before and after Storage in Water

M. Arregui, L. Giner, M. Ferrari and M. Mercadé 143

Preparation of a Poly(Lactic Acid)/Montmorillonite Nanocomposite

K. Nakanishi, S. Yamagata, T. Akasaka, S. Abe, Y. Yoshida and J. Iida 151

Microstructural and Mechanical Properties of Zirconia-Silica-Hydroxyapatite Composite for Biomedical Applications

A. Arabaci, N. Yüksel and N. Demirkol 156

Fabrication of Bioactive Polylactic Acid Composite Formed by 3D Printer

R. Karashima, T. Yabutsuka and T. Yao 160

Characterization and Bioactivity of Hydroxyapatite-ZrO₂ Composites with Commercial Inert Glass (CIG) Addition

B. Bulut, N. Demirkol, Z.E. Erkmen and E.S. Kayali 166

Fibers Obtaining and Characterization Using Poly (Lactic-co-Glycolic Acid) and Poly (Isoprene) Containing Hydroxyapatite and α TCP Calcium Phosphate by Electrospinning Method

F.A. Vechietti, D. Marques, N.O. Muniz and L.A. Santos 173

Dissolution Behavior of Zinc from Gel Composites Consisting of Calcium Phosphate and Alginate

T. Uchino, Y. Negishi and K. Oguma 179

Collagen/Polyurethane-Coated Bioactive Glass: Early Achievements towards the Modelling of Healthy and Osteoporotic Bone

S. Caddeo, F. Baino, A.M. Ferreira, S. Sartori, G. Novajra, G. Ciardelli and C. Vitale-Brovarone 184

VI. Nanoparticles and Nanostructured Ceramics

Magnetic Properties of Mg_{0.4}Ca_{0.6}Fe₂O₄ Nanoparticles Synthesized by Sol-Gel Method for Hyperthermia Treatment

A.M. Escamilla-Pérez, D.A. Cortés-Hernández, J.M. Almanza-Robles, D. Mantovani and P. Chevallier 193

Physico-Chemical Characteristics of TiO₂ Derived Nanotube Synthesized by the Hydrothermal Process as a Bioceramic

H. Eslami, F. Moztarzadeh, T.S. Jafarzadeh Kashi, M. Solati-Hashjin, K. Khoshroo and M. Tahriri 198

Nanostructured Bone Grafting Substitutes Versus Autologous Cancellous Bone – An Animal Experiment in Sheep

T. Gerber, C. Ganz, W. Götz, K. Helms, C. Harms and T. Mittlmeier 202

Sintering Behavior of Nanostructured Hydroxyapatite Ceramics	
J.A. Delgado, L.M. Alonso, J. Nacimento, K.P. Macedo, A. Antunes, M. Varella, A. Alfonso, S. Martínez and M. García-Vallès	207

H₂S Adsorption Capability of Layered Double Hydroxide Containing Transition Metal	
Y. Yokogawa, H. Sano, S. Namba, K. Fujii, Y. Morita, M. Hotta and Y. Doi	212

Development and Characterization of Hydroxyapatite Containing Silver by Precipitation and Immersion Methods	
M.F. Santos, L.C.O. Vercik, A. Vercik and E.C.S. Rigo	216

VII. Coatings, Surface Engineering and Interfaces

Chemical and Heat Treatments for Inducing Bone-Bonding Ability of Ti-6Al-4V Pedicle Screw	
S. Yamaguchi, K. Akeda, K. Murata, N. Takegami, M. Goto, A. Sudo, T. Matsushita and T. Kokubo	225

Fabrication of Bioactive Apatite Nuclei Precipitated Ti-15Mo-5Zr-3Al Alloy by Using Doubled Sandblasting Process	
T. Yabutsuka, H. Mizuno, R. Karashima and T. Yao	231

Novel Bone-Like Porous Glass Coatings on Al₂O₃ Prosthetic Substrates	
F. Baino, F. Tallia, G. Novajra, J. Minguella, M.A. Montealegre, F. Korkusuz and C. Vitale-Brovarone	236

Interface Function Design and Bone-Regenerative Engineering of Biomimetic Biomaterials by Supersonic Treatment Using Electrolyzed Water	
T. Akazawa, M. Murata, Y. Minamida, M.A. Kabir, M. Ito, A. Katayama and T. Nakajima	241

Formation of Calcium-Phosphate Coatings on Ti6Al4V Substrates by an Autocatalytic Deposition Route	
E.A. Aguilar-Reyes, C.A. León-Patiño and B. Jacinto-Díaz	247

Effect of Poling Treatment on Piezoelectric Constant of Pulsed Laser Deposited Hydroxyapatite Thin Films	
T. Nishigaki and S. Hontsu	253

Evaluation of Dentin Tubule Sealing Rate Improved by Attaching Ultrathin Amorphous Calcium Phosphate Sheet	
N. Kato, A. Isai, E. Yamamoto, H. Nishikawa, M. Kusunoki, K. Yoshikawa, K. Yasuo, K. Yamamoto and S. Hontsu	258

A Novel Treatment for Dentine Cavities with Intraoral Laser Ablation Method Using an Er:YAG Laser	
E. Yamamoto, N. Kato, A. Isai, H. Nishikawa, Y. Hashimoto, K. Yoshikawa and S. Hontsu	262

VIII. Additive Manufacturing of Ceramics and Composites

Automatic Casting of Advanced Technical Ceramic Parts via Open Source High Resolution 3D Printing Machines	
J. Minguella, M. Villegas, B. Poll, G. Tena, J.A. Calero, M. Ginebra and F. Korkusuz	269

Effect of Variation of Dispersant and Fluid in the Rapid Prototyping of Alumina	
N.O. Muniz, F.A. Vechietti and L.A. Santos	275

IX. Scaffolds

Tailoring of Bone Scaffold Properties Using Silicate/Phosphate Glass Mixtures	
G. Novajra, P. Perdika, R. Pisano, F. Baino, J.R. Jones, A.R. Boccaccini, R. Detsch and C. Vitale-Brovarone	283

HA/TCP Scaffolds Coated by PLA and Gelatin: Preliminary <i>In Vitro</i> Evaluation	
L.R. Rodrigues, C.A. de Carvalho Zavaglia and C.B. Lombello	289

P19.CL6 Cells Cultured in Apatite-Fiber Scaffold Differentiate into Cardiomyocytes	
K. Yasuda, H. Ishii, M. Takahara, M. Aizawa and N. Kanzawa	295

Bio-Hybrid Scaffolds for Bone Tissue Engineering: Nano-Hydroxyapatite/Chitosan Composites	
B. Palazzo, D. Izzo, F. Scalera, A.N. Cancelli and F. Gervaso	300

Investigating Approaches for Three-Dimensional Printing of Hydroxyapatite Scaffolds for Bone Regeneration

Z.X. Zhou, F. Buchanan, A. Lennon and N. Dunne

306

X. Ceramics for Drug Delivery

pH Effect on the Dissolution Behavior of the Microspheres Containing Strontium Ranelate

A.P. Duarte Moreira, M.S. Sader, G.D. de Almeida Soares and M.H.M. Rocha Leão

315

Bone Substitutes as a Drug Delivery of Antibiotics

C. Ganz and T. Gerber

321

Fabrication of Hydroxyapatite Microcapsule Containing Vitamin B₁₂ for Sustained-Release

T. Yabutsuka, K. Iwahashi, H. Nakamura and T. Yao

326

Controlled Release of a Protein Using a Ceramic Carrier and Zinc Ions as a Novel Approach to the Treatment of Osteoporosis

H. Watanabe, T. Ikoma, M. Tanaka, T. Yoshioka and J. Tanaka

332

XI. Cell-Material Interactions

Effect of Surface Silver Ions towards Inhibiting Bacterial Growth on Apatite

E.S. Thian, P.N. Lim, B. Ho, B.Y. Tay and W. Wang

341

Multiparametric *In Vitro* Evaluation of Cytocompatibility of 1% Strontium-Containing Nanostructured Hydroxyapatite

D. Reis, D. Silva, J. Côrtes, L. Hummel, E. Mavropoulos, A. Linhares and G. Alves

345

Effects of Albumin Adsorption on Cell Adhesion in Hydroxyapatite Modified Surfaces

J. Côrtes, E. Mavropoulos, M. Hausen, A. Rossi and G. Alves

351

Evaluation of Commercial Latex as a Positive Control for *In Vitro* Testing of Bioceramics

E.S. Lourenço, J. Côrtes, J. Costa, A. Linhares and G. Alves

357

Characterization of Human Osteoclasts on Different Bioceramics

M. Nakamura, T. Hentunen, J. Vääräniemi, J. Salonen, N. Hori and K. Yamashita

363

***In Vitro* Cell Response to Protein Adhesion on Commercial β-TCP**

M.S. Sader, E. Mavropoulos, A.P. Moreira Duarte, M. Hausen, A.M. Costa, J. Dornelas, M.N. Tanaka, G.A. Soares and A. Rossi

367

Boron Containing Nano Hydroxyapatites (B-n-HAp) Stimulate Mesenchymal Stem Cell Adhesion, Proliferation and Differentiation

E. Ciftci, S. Köse, P. Korkusuz, M. Timuçin and F. Korkusuz

373

Real-Time Evaluation of the Effects of Dexamethasone on Osteoblasts Using Dual Labeling with Fluorescent Probes

H. Ohsugi, J. Hatsukawa, M. Takahara, M. Aizawa and N. Kanzawa

379

The Antimicrobial Action of Silver Halides in Calcium Phosphate

D. Kalnina, K. Gross, P. Onufrijevs, E. Dauksta, V. Nikolajeva, Z. Stankeviciute and A. Kareiva

384

Evaluation of the Effects of Ag Ion Concentration on Osteoblast Activity

S.B. Cho, G.J. Yoon, E.M. An, Y.J. Kim, T.N. Kim, H.D. Jang, J.Y. Choi and I. Noh

390

XII. Preclinical Models: Animal Studies

Development of Bioresorbable Calcium-Phosphate Cements Hybridized with Gelatin Particles and their *In Vivo* Evaluation Using Pig's Tibia Model

K. Kiminami, K. Matsuoka, K. Nagata, T. Konishi, M. Honda, G. Hayashida, K. Nakano, M. Nagaya, H. Arimura, H. Nagashima and M. Aizawa

397

***In Vivo* Evaluation of Chelate-Setting Cement Fabricated from Hydroxyapatite Including Bone Minerals Using a Rabbit's Tibia Model**

M. Aizawa, Y. Chibu, K. Nagata, T. Konishi, K. Ishii, H. Funao, Y. Toyama, M. Matsumoto and M. Honda

402

***Ex Vivo* Model for Percutaneous Vertebroplasty**

M.T. Oliveira, S. Lucena, J. Potes, M.C. Queiroga, S. Rehman, K. Dalgarno, A. Ramos and J.C. Reis

408

Elastic Blocks: Hydrogel-Embedded Granules as Bone Grafting Substitutes F. Zaage, M. Dau, C. Ganz, B. Frerich and T. Gerber	414
A Histological and Radiological Study of Bone Formation around Porous Resorbable β-Tricalcium Phosphate Used as Bone Defect Filling M. Strnadová, T. Kučera, M.D. Cevallos Lecaro, J. Štrnad, Z. Štrnad and A. Nežíková	420
In Vivo Osteogenesis Assessment of a Tricalcium Phosphate Paste and a Tricalcium Phosphate Foam Bone Grafting Materials M.A. Lopez-Heredia, D. Barnewitz, A. Genzel, M. Stiller, F. Peters, W.D. Hübner, B. Stang, A. Kuhr and C. Knabe	426
Bone Induction in Porous HA Block Modified by Partial Dissolution-Precipitation Technique with Supersonic Treatment in Rat Scalp M. Murata, T. Akazawa, Y. Minamida, M.A. Kabir, J. Hino, H. Nagayasu, M. Ito, M. Sakamoto and T. Nakajima	430
Poly (L-Lactic Acid) and Hydroxyapatite Scaffold for Bone Regeneration: In Vivo Study G.N.P. Rodriguez, L.R. Rodrigues, R.C.F. Basso, P. Kharmandayan, C.A.C. Zavaglia and M.A. D'Ávila	435

XIII. Clinical Applications

Radiographic Changes Observed in THA Cemented Sockets Using Bone Cement and Hydroxyapatite Granules J. Tamura, Y. Asada, H. Nishida, M. Oota, M. Izeki, S. Yoshida, Y. Hira and Y. Matsuda	443
Bioceramic Materials Show Reduced Pathological Biofilm Formation C. Piconi, A.C. Ionescu, A. Cochis, E. Iasi, E. Brambilla and L. Rimondini	448