

Table of Contents

Preface, Committees and Acknowledgements

I. Bioceramics for Healthcare

Bio-Ceramics for the Next 25 Years: Challenges and Opportunities

L.L. Hench 3

II. Apatites

Carbonate Apatite Bone Replacement

I. Kunio 17

Freeze-Casted Nanostructured Apatite Scaffold Obtained from Low Temperature

Biomineralization of Reactive Calcium Phosphates
S. Hesaraki 21

Influence of the Precipitation Temperature on Properties of Nanohydroxyapatite Powder for the Fabrication of Highly Porous Bone Scaffolds

C. Parisi, F. Gervaso, F. Scalera, S.K. Padmanabhan, C. Nobile, P.D. Cozzoli, L. Di Silvio and A. Sannino 27

Effects of Commercial Inert Glass (CIG) Addition on Mechanical and Microstructural Properties of Chicken Hydroxyapatite (CHA)

N. Demirkol, A.Y. Oral, F.N. Oktar and E.S. Kayali 33

The Adsorption of Cytochrome C on Mesoporous Silica Coated Hydroxyapatite Ceramics in PBS Solution

Y. Yokogawa, S. Ito, Y. Yamato and I. Kishida 39

Synthesis and Characterization of an Experimental Zn-Hydroxyapatite Powders with Application in Dentistry

D. Prodan, M. Moldovan, C. Prejmerean, L. Silaghi-Dumitrescu, S. Boboia, V. Popescu, V. Pascalau, A. Molea, L. Diana and I. Perhaita 43

Synthesis of Carbonate Apatite Foam Using β -TCP Foams as Precursors

K. Tsuru, T. Nikaido, M.L. Munar, M. Maruta, S. Matsuya, S. Nakamura and I. Kunio 52

Synthesis of Ag-Containing CaO-SiO₂ Gel and its Apatite Forming Ability in Simulated Body Fluid

S.B. Cho, G.J. Yoon, E.M. An, Y.J. Kim, T.N. Kim, H.D. Jang, E.S. Shin, C. Ohtsuki and I.Y. Kim 56

III. Calcium Phosphates

Comparative Critical Study of Commercial Calcium Phosphate Bone Substitutes in Terms of Physic-Chemical Properties

T. Miramond, P. Borget, S. Baroth and D. Guy 63

Phosphating of Calcium Carbonate for Obtaining Hydroxyapatite from the Ostrich Egg Shell

J.R.M. Ferreira, D. Navarro da Rocha, L.H.L. Louro and M.H. Prado da Silva 69

Charge State of Silver Halide Colloids Determines the Antibacterial Activity in Amorphous Calcium Phosphate

K. Gross, D. Kalnina, Z. Stankeviciute and V. Nikolajeva 74

Nano Calcium Phosphate Powder Production through Chemical Agitation from Atlantic Deer Cowrie Shells (*Cypraea cervus Linnaeus*)

O. Gunduz, Y.M. Sahin, S. Agathopoulos, D. Ağaoğulları, H. Gökçe, E.S. Kayali, C. Aktas, B. Ben-Nissan and F.N. Oktar 80

Synthesis of Nano Calcium Phosphate via Biomimetic Method for Bone Tissue Engineering Scaffolds and Investigation of its Phase Transformation in Simulated Body Fluid

M. Raz, F. Moztaizadeh, M.A. Shokrgozar and M. Tahriri 86

Microporous β-Tricalcium Phosphate (TCP) - A Delivery Vehicle of Growth Factors and Drugs	
A. Bernstein, N. Suedkamp, H.O. Mayr, S. Kißling and M. Seidenstuecker	93
Traversing Phase Fields towards Nanosized Beta Tricalcium Phosphate	
K. Gross, J. Andersons, M. Misevicius and J. Švirks	97

IV. Characterization & Testing

rhBMP-2 Induces Immature Muscular Tissue to Differentiate into Bone-Like Tissue <i>In Vitro</i>	
T. Hayashi, K. Yoshihara, M. Kawase, A. Mieki, H. Kataoka, S. Hamajima and T. Kawai	103
<i>In Situ</i> X-Ray Diffraction Study of Phase Development during Hardening of β-Tricalcium Phosphate Bone Cements with Chitosan	
M.S. Tonoli and M.M. Beppu	109
Preparation and Characterization of Micro-Nanostructured Anatase Film	
M. He, K. Cheng and W.J. Weng	115
Study of some Dental Biomaterials Properties Using an Original Software Application	
V. Prejmerean, L. Silaghi-Dumitrescu, D. Prodan, C. Prejmerean and M. Moldovan	121
Production and Characterization of Hydroxyapatite/Niobo Phosphate Glass Scaffold	
D. Navarro da Rocha, L.R. de Oliveira Cruz, J.L. do Prado Neto, N.M.E. Ayad, L. de Andrade Gobbo and M.H. Prado da Silva	128
Influence of Nanograin Size ZrO_2 and Al_2O_3 Ceramics on Biological Response of Cells	
A. Matoušek, M. Kukletová and J. Cihlár	132

V. Synthesis & Biomanufacturing

Novel Bioactive Materials neither Based on Calcium Phosphate Nor Silicate: Titanium Oxide	
T. Kokubo	141
Production and Mechanical Properties of Commercial Synthetic Hydroxyapatite (CSHA) Composites	
N. Demirkol, F.N. Oktar and E.S. Kayali	147
Nanoparticles for Biomedical Applications Prepared by CO_2 Laser Vaporization	
F.A. Müller, H.D. Kurland and J. Grabow	154
Fabrication of Magnetic Hydroxyapatite Microcapsule for Protein Collection	
S. Kumazawa, D. Hisashuku, T. Yabutsuka and T. Yao	160
Fabrication of Bioactive Apatite Nuclei Precipitated Polylactic Acid by Using Sandblasting Process	
T. Yabutsuka, H. Mizuno and T. Yao	165
Exploring Zinc Apatites through Different Synthesis Routes	
A. Brangule, K. Gross, L. Komarovska and A. Viksna	171

VI. Composite Materials

Biodegradability of some Collagen Sponges Reinforced with Different Bioceramics	
V.I. Antoniac	179
Fish Scales as a Biocomposite of Collagen and Calcium Salts	
A. Sionkowska and J. Kozłowska	185
Biomimetic Composites Based on Calcium Phosphates and Chitosan - Hyaluronic Acid with Potential Application in Bone Tissue Engineering	
F.D. Ivan, A. Marian, C.E. Tanase, M. Butnaru and L. Verestiuc	191
Novel Three-Component Composite Materials (Hydroxyapatite/Polymer Mixtures) for Bone Regeneration	
R.M. Ion, A.A. Poinescu and S.M. Doncea	197
Biological Properties of Chitosan/Collagen Composites	
A. Sionkowska, B. Kaczmarek, J. Stalinska and A.M. Osyczka	205

Bioactivity of a Poly(70lactic-co-30glycolic acid)/15CaO-85SiO₂ Composite with a Dual Pore Structure	
H.Y. Shin, S.H. Shin and S.H. Rhee	211
The Effect of Bioglass Addition on Mechanical and Physical Properties of Photoactive UDMA-TEGDMA Resin Composites	
L.C. Nicolae, R.M. Shelton, P.R. Cooper, R.A. Martin and W.M. Palin	215
Membranes of Chitosan and Collagen-Type 1 for Biomineralization/Osteogenesis	
R.B. Pacheco, M.S. Tonoli and M.M. Beppu	222

VII. Scaffolds & Tissue Engineering

Biomimetics and Marine Materials in Drug Delivery and Tissue Engineering: From Natural Role Models to Bone Regeneration	
B. Ben-Nissan	229
Nano-Hybrid-Composite Scaffolds from Substituted Apatite/Gelatin	
A.A. Mostafa, D.M. Ibrahim, S.I. Korowash, F. Fahim and H. Oudadesse	233
Preparation and Characterization of Collagen/Hydroxyapatite Microsphere Composite Scaffold for Bone Regeneration	
K.P. Sanosh, F. Gervaso, A. Sannino and A. Licciulli	239
Silk Fibroin/Nano-CaP Bilayered Scaffolds for Osteochondral Tissue Engineering	
L.P. Yan, J.M. Oliveira, A.L. Oliveira and R.L. Reis	245
Development of a Novel Hybrid Porous Scaffold for Bone Tissue Engineering: Forsterite Nanopowder Reinforced Chitosan	
F. Scalera, F. Gervaso, K.P. Sanosh, I.E. Palamà, S. Dimida and A. Sannino	249
Gellan Gum-Based Hydrogel Bilayered Scaffolds for Osteochondral Tissue Engineering	
D.R. Pereira, R.F. Canadas, J. Silva-Correia, A.P. Marques, R.L. Reis and J.M. Oliveira	255

VIII. Coatings, Surface Engineering & Biomimetic Materials

Recent Progress in the Field of Multicomponent Biocompatible Nanostructured Films	
D. Shtansky, E.A. Levashov, I.V. Batenina, N.A. Gloushankova, N.Y. Anisimova, M.V. Kiselevsky and I.V. Reshetov	263
Bioactive Ti Metal with Ca-Enriched Surface Layer Able to Release Sr Ions	
S. Yamaguchi, S. Nath, T. Matsushita and T. Kokubo	269
TiSiN Coatings for Improved Bond Strength of CoCr Alloy to Dental Ceramic	
M. Dinu, V. Braic, G. Colease, F. Baciuc, M.C. Cotrut, M. Braic, M. Tarcolea, C. Vitelaru, A. Vladescu and M.D. Vrânceanu	275
CO₂ Laser Assisted Processing of Bioactive Titanium-Based Surfaces	
S. Gräf and F.A. Müller	282
New Titanium Alloys Potentially Used for Metal-Ceramic Applications in Medicine	
A.C. Bărbîntă, D. Luca, S.I. Strugaru, C. Biniuc, A. Barca, E. Bărcă, V.I. Antoniac and C. Munteanu	287
Heat Treatments Influence on Corrosion Behaviour of Some Metallic Biomaterials Potentially Used in Metal-Ceramic Prosthesis	
N. Ghiban, B. Ghiban, N. Șerban and A. Ghiban	293
Influence of Thermal Treatment on the Roughness, Corrosion Resistance and Wettability of Hydroxyapatite Films Deposited by RF Magnetron Sputtering	
M. Dinu, A.E. Kiss, A.C. Parau, V. Braic, C. Vitelaru, M. Braic, I. Pana, M. Balaceanu and A. Vladescu	297
In Vitro Evaluation of the Cytotoxicity of Some New Titanium Alloys	
A.C. Bărbîntă, K. Earar, C.I. Crimu, L.A. Drăgan and C. Munteanu	303
Dynamic Mechanical Analysis of Some Ti-Mo Alloys in Correlation with Microstructural Aspects and Surface Properties	
N. Ghiban, B. Ghiban, N. Șerban and A. Ghiban	309

IX. Clinical Applications in Dentistry

The Biofilm Formation onto Implants and Prosthetic Materials May Be Contrasted Using Gallium (3+)	
L. Rimondini, C. Della Valle, A. Cochis, B. Azzimonti and R. Chiesa	315
Eight-Year Clinical Follow-Up of Sinus Grafts with Micro-Macroporous Biphasic Calcium Phosphate Granules	
K.C. Seong, K.S. Cho, C. Daculsi, E. Seris and D. Guy	321
Socket Preservation Procedure after Tooth Extraction	
C. Dimova	325
Optical Imaging of Oral Squamous Cell Carcinoma Using Optical Coherence Tomography and Micro CT	
S. Cănjău, C. Todea, C. Sinescu, M.L. Negrutiu, V. Duma, A. Mănescu, F. Topală and A.G. Podoleanu	331
The Micro CT Evaluation of Different Types of Matrices in Rats Bone Augmentation	
L.C. Rusu, A. Mănescu, M.L. Negrutiu, C. Sinescu, S. Ardelean, B. Hoinoiu and M. Rominu	338
Ceramics and Orthodontics	
A. Mesaros, M. Mesaros, D. Dudea, A. Muntean and M. Badea	343
The Aesthetic Effect of All-Ceramic Pressed Crowns According to the Thickness and Color of the Materials Used - An <i>In Vitro</i> Study	
S. Drafta, A. Popescu and V. Naicu	349
A Retrospective Study on the Incidence of Chipping of Zirconia-Based Restorations	
I. Babiuc and M. Pauna	356
<i>In Vitro</i> Evaluation of New Dental Software for Shade Matching	
B. Culic, V. Prejmerean, C. Gasparik, C. Culic, C. Dragos and D. Dudea	360
Study of the Expansion Behaviour of Some Materials Used in the Dental Metal-Ceramic Technology	
H.O. Manolea, V.I. Antoniac, N. Florescu, P. Măreşcu, M. Miculescu and I.T. Dascălu	366
A Pilot Study Regarding the Biomechanical Behaviour of Endosteal Implants	
C. Dobreci, A. Petre and M. Traistaru	372

X. Clinical Applications in Orthopedics

Bioceramic and Fibrin Sealant in High Tibial Valgus Osteotomy: Prospective Clinical Study	
D. Guy, J.L. Rouvillain, T. Fabre, Y. Catonné, M. Bagot d'Arc, J.M. N'Guyen and M. Durand	381
Bioactive Titanium for Implants and Bone Substitutes	
T. Nakamura, S. Fujibayashi and M. Takaemoto	387
Synthesis of Controlateral Hip Fracture in Osteoporotic Patients – Prophylactic Treatment	
S. Cristea, A. Groseanu, A. Prundeanu, D. Gartonea and S. Dragosloveanu	391
Transfemoral Fixation in Soft Tissue Cruciate Ligament Reconstructions – Composite Versus Polymeric Implant Analysis	
D. Laptoiu, R. Marinescu and I. Botezatu	397
The Potential of Antibiotic Collagen Based Biocomposites for the Treatment of Bone Defects	
I. Cristescu, L. Marina, D. Vilcioiu, F. Safta, M. Istodorescu and A. Stere	404
Bridging and Repairing Patient Specific Acetabular Defects with a New Custom Acetabular Cage	
S. Costin, C.A. Micu and S. Cristea	412
Biomechanics of Vertebroplasty: Effect of Cement Viscosity on Mechanical Behaviour	
J.R.M. Craig and N. Dunne	416
Osteoconductive Bone Substitutes as Treatment of Benign Lytic Lesions	
S. Dragosloveanu, S. Cristea and D. Zaharie	422
Study of Bone Restoration Ca-Si-Zn Complex	
R.J. Chung, H.Y. Wang, K.S. Chen and H.Y. Wu	427
CAD Method for Profiling Helical Surfaces of Parts Used in the Orthopaedic Reconstruction Surgery	
N. Baroiu, M. Atudorei, S. Berbinschi and V. Teodor	431
Radiographic Analysis of Bone Remodeling around Hydroxyapatite Coated Femoral Stems	
R. Marinescu, D. Laptoiu and I. Botezatu	436