

## DAFTAR PUSTAKA

- Abdollahi, M., Larijani, L., Rahimi, R., and Salari, O., 2005, Role of oxidative stress in osteoporosis, *Therapy*, 2, 787–796.
- Ahn, G., Lee, J.Y., Seol, D.W., Pyo, S.G., and Lee, D., 2013, The effect of calcium phosphate cement-silica composite materials on proliferation and differentiation of pre-osteoblast cells, *Mater. Lett.*, 109, 302–305.
- Albert, K., Huang, X., and Hsu, H., 2017, Bio-templated silica composites for next-generation biomedical applications, *Adv. Colloid Interface Sci.*, 249, 272–289.
- Amir H. and Bambang G. M., 2017, Uji microtetrazolium (MTT) ekstrak metanol daun *phaleria macrocarpa* (Scheff.) boerl terhadap sel kanker payudara MCF, *Alotrop*, 1, 27–32.
- Apelt, D., Theiss, F., El-Warrak, A.O., Zlinszky, K., Bettschart-Wolfisberger, R., Böhner, M., Matter, S., Auer, J.A., and Von Rechenberg, B., 2004, In vivo behavior of three different injectable hydraulic calcium phosphate cements, *Biomaterials*, 25, 1439–1451.
- Arahira, T., Maruta, M., and Matsuya, S., 2017, Development and characterization of carbonate apatite/ $\beta$ -tricalcium phosphate biphasic cement, *Mater. Lett.*, 194, 205–208.
- Arcos, D., Boccaccini, A.R., Böhner, M., Díez-Pérez, A., Epple, M., Gómez-Barrena, E., Herrera, A., Planell, J.A., Rodríguez-Mañas, L., and Vallet-Regí, M., 2014, The relevance of biomaterials to the prevention and treatment of osteoporosis, *Acta Biomater.*, 10, 1793–1805.
- Bae, J., Ida, Y., Sekine, K., Kawano, F., and Hamada, K., 2015, Effects of high-energy ball-milling on injectability and strength of  $\beta$ -tricalcium-phosphate cement, *J. Mech. Behav. Biomed. Mater.*, 47, 77–86.
- Bahuguna, A., Khan, I., Bajpai, V.K., and Kang, S.C., 2017, MTT assay to evaluate the cytotoxic potential of a drug, *Bangladesh J. Pharmacol.*, 12, 115–118.
- Bareiro, O. and Santos, L.A., 2014, Tetraethylorthosilicate (TEOS) applied in the surface modification of hydroxyapatite to develop polydimethylsiloxane/hydroxyapatite composites, *Colloids Surfaces B Biointerfaces*, 115, 400–405.
- Bernhardt, A., Dittrich, R., Lode, A., Despang, F., and Gelinsky, M., 2013, Nanocrystalline spherical hydroxyapatite granules for bone repair: In vitro evaluation with osteoblast-like cells and osteoclasts, *J. Mater. Sci. Mater. Med.*, 24, 1755–1766.
- Böhner, M., Galea, L., and Doebelin, N., 2012, Calcium phosphate bone graft substitutes: Failures and hopes, *J. Eur. Ceram. Soc.*, 32, 2663–2671.
- Böhner, M. and Lemaitre, J., 2009, Can bioactivity be tested in vitro with SBF solution?, *Biomaterials*, 30, 2175–2179.
- Böhner, M., Santoni, B.L.G., and Döbelin, N., 2020,  $\beta$ -tricalcium phosphate for bone substitution: Synthesis and properties, *Acta Biomater.*, 113, 23–41.
- Borodajenko, L.B.-C. and Natalija, 2012, Research of calcium phosphates using fourier transform infrared spectroscopy,. In, Theophile,T. (ed), *Infrared Spectroscopy - Materials Science, Engineering and Technology*. Intech,

Croatia, pp. 123–148.

- Bow, J.S., Liou, S.C., and Chen, S.Y., 2004, Structural characterization of room-temperature synthesized nano-sized  $\beta$ -tricalcium phosphate, *Biomaterials*, 25, 3155–3161.
- Cao, J.M., Feng, J., Deng, S.G., Chang, X., Wabg, J., Liu, J.S., Lu, P., Lu, H.X., Zheng, M.B., Zhang, F., and Tao, J., 2005, Microwave-assisted solid-state synthesis of hydroxyapatite nanorods at room temperature, *J. Mater. Sci. Lett.*, 40, 6311–6313.
- Carrodegua, R.G. and Aza, S. De, 2011,  $\alpha$ -Tricalcium phosphate: Synthesis, properties and biomedical applications, *Acta Biomater.*, 7, 3536–3546.
- Carter, D.R. and Hayes, W.C., 1977, The compressive behavior of bone as two-phase porous structure, *J. Bone Jt. Surg.*, 59, 954–962.
- Celardo, I., Pedersen, J.Z., Traversa, E., and Ghibelli, L., 2011, Pharmacological potential of cerium oxide nanoparticles, *Nanoscale*, 3, 1411.
- Champion, E., 2013, Sintering of calcium phosphate bioceramics, *Acta Biomater.*, 9, 5855–5875.
- Charriere, S., Terrazzoni, S., Pittet, C., Mordasini, P., Dutoit, M., Lemaitre, J., and Zysset, P., 2001, Mechanical characterization of brushite and hydroxyapatite cements, *Biomaterials*, 22, 2937–2945.
- Chen, W.C., Ju, C.P., Wang, J.C., Hung, C.C., and Chern Lin, J.H., 2008, Brittle and ductile adjustable cement derived from calcium phosphate cement/polyacrylic acid composites, *Dent. Mater.*, 24, 1616–1622.
- Choudhury, B., Chetri, P., and Choudhury, A., 2015, Annealing temperature and oxygen-vacancy-dependent variation of lattice strain, band gap and luminescence properties of CeO<sub>2</sub> nanoparticles, *J. Exp. Nanosci.*, 10, 103–114.
- Ciobanu, C., Popa, C., and Predoi, D., 2016, Cerium doped hydroxyapatite nanoparticles synthesized by coprecipitation method, *J. Serbian Chem. Soc.*, 81, 433–446.
- Combes, C., Cazalbou, S., and Rey, C., 2016, Apatite Biominerals, *Minerals*, 6, 1–25.
- Curtis, E.M., Moon, R.J., Harvey, N.C., and Cooper, C., 2017, The impact of fragility fracture and approaches to osteoporosis risk assessment worldwide, *Int. J. Orthop. Trauma Nurs.*, 26, 7–17.
- David Chen, C.H., Chen, C.C., Shie, M.Y., Huang, C.H., and Ding, S.J., 2011, Controlled release of gentamicin from calcium phosphate/alginate bone cement, *Mater. Sci. Eng. C*, 31, 334–341.
- Dee, K.C., Puleo, D.A., and Bizios, R., 2002, Tissue-biomaterial interactions, John Wiley & sons, New Jersey.
- Denry, I. and Kuhn, L.T., 2016, Design and characterization of calcium phosphate ceramic scaffolds for bone tissue engineering, *Dent. Mater.*, 32, 43–53.
- Dorozhkin, S., 2015, Calcium orthophosphate deposits: Preparation, properties and biomedical applications, *Mater. Sci. Eng. C*, 55, 272–326.
- Dorozhkin, S. V, 2009, Calcium orthophosphate cements and concretes, *Materials (Basel)*, 2, 221–291.
- Dorozhkin, S.V., 2017, Calcium phosphate-based bioceramics and its clinical application., In, Kaur, G. (ed), *Clinical applications of biomaterials*. Springer

Nature, Switzerland, pp. 123–226.

- Durairaj, K., Senthilkumar, P., Velmurugan, P., and Dhamodaran, K., 2019, Sol-gel mediated synthesis of silica nanoparticle from *Bambusa vulgaris* leaves and its environmental applications: Kinetics and isotherms studies, *J. Sol-Gel Sci. Technol.*, 90, 653–664.
- Ebrahimi, M., Botelho, M.G., and Dorozhkin, S. V., 2017, Biphasic calcium phosphates bioceramics (HA/TCP): Concept, physicochemical properties and the impact of standardization of study protocols in biomaterials research, *Mater. Sci. Eng. C*, 71, 1293–1312.
- Fahami, A., Beall, G.W., and Betancourt, T., 2016, Synthesis, bioactivity and zeta potential investigations of chlorine and fluorine substituted hydroxyapatite, *Mater. Sci. Eng. C*, 59, 78–85.
- Feng, Z., Liao, Y., and Ye, M., 2005, Synthesis and structure of cerium-substituted hydroxyapatite, *J. Mater. Sci. Mater. Med.*, 6, 417–421.
- Florencio-silva, R., Rodrigues, G., Sasso-cerri, E., Simões, M.J., Cerri, P.S., and Cells, B., 2015, Biology of bone tissue: Structure, function, and factors that influence bone cells, *Biomed Res. Int.*, 1–17.
- Galea, L., Alexeev, D., Bohner, M., Doebelin, N., Studart, A.R., Aneziris, C.G., and Graule, T., 2015, Textured and hierarchically structured calcium phosphate ceramic blocks through hydrothermal treatment, *Biomaterials*, 67, 93–103.
- Garai, S. and Sinha, A., 2016, Three dimensional biphasic calcium phosphate nanocomposites for load bearing bioactive bone grafts, *Mater. Sci. Eng. C*, 59, 375–383.
- Gbureck, U., Dembski, S., Thull, R., and Barralet, J.E., 2005, Factors influencing calcium phosphate cement shelf-life, *Biomaterials*, 26, 3691–3697.
- Geffers, M., Barralet, J.E., Grolla, J., and Gbureck, U., 2015, Dual-setting brushite-silica gel cements, *Acta Biomater.*, 11, 467–476.
- Ginebra, M.P., Canal, C., Espanol, M., Pastorino, D., and Montufar, E.B., 2012, Calcium phosphate cements as drug delivery materials, *Adv. Drug Deliv. Rev.*, 64, 1090–1110.
- Ginebra, M.P., Espanol, M., Montufar, E.B., Perez, R.A., and Mestres, G., 2010, New processing approaches in calcium phosphate cements and their applications in regenerative medicine, *Acta Biomater.*, 6, 2863–2873.
- Ginebra, M.P., Traykova, T., and Planell, J.A., 2006, Calcium phosphate cements as bone drug delivery systems: A review, *J. Control. Release*, 113, 102–110.
- Graulis, S., Chateigner, D., Downs, R.T., Yokochi, A.F.T., Quirós, M., Lutterotti, L., Manakova, E., Butkus, J., Moeck, P., and Le Bail, A., 2009, Crystallography open database - An open-access collection of crystal structures, *J. Appl. Crystallogr.*, 42, 726–729.
- Gražulis, S., Daškevič, A., Merkys, A., Chateigner, D., Lutterotti, L., Quirós, M., Serebryanaya, N.R., Moeck, P., Downs, R.T., and Le Bail, A., 2012, Crystallography open database (COD): An open-access collection of crystal structures and platform for world-wide collaboration, *Nucleic Acids Res.*, 40, 420–427.
- Gražulis, S., Merkys, A., Vaitkus, A., and Okulič-Kazarinas, M., 2015, Computing

- stoichiometric molecular composition from crystal structures, *J. Appl. Crystallogr.*, 48, 85–91.
- Han, B., Ma, P.W., Zhang, L.L., Yin, Y.J., Yao, K. De, Zhang, F.J., Zhang, Y.D., Li, X.L., and Nie, W., 2009,  $\beta$ -TCP/MCPM-based premixed calcium phosphate cements, *Acta Biomater.*, 5, 3165–3177.
- Hanson, B., 2001, Hydroxyapatite, *Apatite.mo*, 1.
- Haynes, B., 2017, What are osteoporosis & osteopenia?, [www.osc-ortho.com](http://www.osc-ortho.com), 1.
- Heinemann, S., Rössler, S., Lemm, M., Ruhnow, M., and Nies, B., 2013, Properties of injectable ready-to-use calcium phosphate cement based on water-immiscible liquid, *Acta Biomater.*, 9, 6199–6207.
- Hernlund, E., Svedbom, A., Ivergård, M., Compston, J., Cooper, C., Stenmark, J., McCloskey, E. V., and Jönsson, B., 2013, Osteoporosis in the European Union: Medical management, epidemiology and economic burden, *Arch Osteoporos*, 8, 3–4.
- Hirst, S.M., Karakoti, A.S., Tyler, R.D., Sriranganathan, N., Seal, S., and Reilly, C.M., 2009, Anti-inflammatory properties of cerium oxide nanoparticles, *Small*, 5, 2848–2856.
- Hu, M., Xiao, F., Ke, Q.F., Li, Y., Chen, X.D., and Guo, Y.P., 2019, Cerium-doped whitlockite nanohybrid scaffolds promote new bone regeneration via SMAD signaling pathway, *Chem. Eng. J.*, 359, 1–12.
- Huang, W., Mao, Z., Chen, L., Chi, Y., Jiang, H., Zimba, B.L., Xiong, G., and Wu, Q., 2018, Synthesis and characterisation of fluorescent and biocompatible hydroxyapatite nanoparticles with cerium doping, *Micro Nano Lett.*, 13, 699–703.
- Ioku, K., Kawachi, G., Sasaki, S., Fujimori, H., and Goto, S., 2006, Hydrothermal preparation of tailored hydroxyapatite, *J. Mater. Sci.*, 41, 1341–1344.
- Jones, M., 2012, The ionic concentration and potential difference as a function of distance, *Wikipedia*, 1.
- Kaplan, S.J., Hayes, W.C., and Stone, J.L., 1985, Tensile strength of bovine trabecular bone, *J. Biomech.*, 18, 723–727.
- Karimi, R., Abbas, A., Nourbakhsh, N., Nourbakhsh, M., and Mackenzie, K.J.D., 2017, Phase formation, microstructure and setting time of MCM-48 mesoporous silica nanocomposites with hydroxyapatite for dental applications: Effect of the Ca/P ratio, *Ceram. Int.*, 43, 12857–12862.
- Kaur, G., 2017, Clinical applications of biomaterials: State-of-the-art progress, trends, and novel approaches, Springer Internasional Publishing, Switzerland.
- Kaur, K., Singh, K.J., Anand, V., Islam, N., Bhatia, G., Kalia, N., and Singh, J., 2017, Lanthanide (=Ce, Pr, Nd and Tb) ions substitution at calcium sites of hydroxyl apatite nanoparticles as fluorescent bio probes: Experimental and density functional theory study, *Ceram. Int.*, 43, 10097–10108.
- Khan, M.E., Khan, M.M., and Cho, M.H., 2017, Ce<sup>3+</sup>-ion, surface oxygen vacancy, and visible light-induced photocatalytic dye degradation and photocapacitive performance of CeO<sub>2</sub>-graphene nanostructures, *Sci. Rep.*, 7, 1–17.
- Khan, M.M.A. and Rafiuddin, 2012, Synthesis, electrochemical characterization, antibacterial study and evaluation of fixed charge density of polystyrene based calcium-strontium phosphate composite membrane, *Desalination*, 284, 200–

206.

- Khan, R. and Dhayal, M., 2008, Electrochemical studies of novel chitosan/TiO<sub>2</sub> bioactive electrode for biosensing application, *Electrochem. commun.*, 10, 263–267.
- Kim, I. and Kumta, P.N., 2004, Sol–gel synthesis and characterization of nanostructured hydroxyapatite powder, *Mater. Sci. Eng. B*, 111, 232–236.
- Kim, S.Y. and Jeon, S.H., 2012, Setting properties, mechanical strength and in vivo evaluation of calcium phosphate-based bone cements, *J. Ind. Eng. Chem.*, 18, 128–136.
- Kondo, N., Ogoose, A., Tokunaga, K., Ito, T., Arai, K., Kudo, N., Inoue, H., Irie, H., and Endo, N., 2005, Bone formation and resorption of highly purified  $\beta$ -tricalcium phosphate in the rat femoral condyle, *Biomaterials*, 26, 5600–5608.
- Kumar, N.P., Mishra, S.K., and Kannan, S., 2017, Structural perceptions and mechanical evaluation of  $\beta$ -Ca<sub>3</sub>(PO<sub>4</sub>)<sub>2</sub>/c-CeO<sub>2</sub> composites with preferential occupancy of Ce<sup>3+</sup> and Ce<sup>4+</sup>, *Inorg. Chem.*, 56, 3600–3611.
- Kunert-Keil, C., Scholz, F., Gedrange, T., and Gredes, T., 2015, Comparative study of biphasic calcium phosphate with beta-tricalcium phosphate in rat cranial defects- A molecular-biological and histological study, *Ann. Anat.*, 199, 79–84.
- Lan, L.I., Geng-Shen, H.U., Ji-Qing, L.U., and Meng-Fei, L.U.O., 2012, Review of oxygen vacancies in CeO<sub>2</sub>-doped solid solutions as characterized by raman spectroscopy, *Acta Phys. -Chim. Sin.*, 28, 1012–1020.
- Larese, C., Galisteo, F.C., Granados, M.L., Mariscal, R., Fierro, J.L.G., Lambrou, P.S., and Efstathiou, A.M., 2004, Effects of the CePO<sub>4</sub> on the oxygen storage and release properties of CeO<sub>2</sub> and Ce<sub>0.8</sub>Zr<sub>0.2</sub>O<sub>2</sub> solid solution, *J. Catal.*, 226, 443–456.
- Larsson, S., Stadelmann, V.A., Arnoldi, J., Behrens, M., Hess, B., Procter, P., Murphy, M., and Pioletti, D.P., 2012, Injectable calcium phosphate cement for augmentation around cancellous bone screws. In vivo biomechanical studies, *J. Biomech.*, 45, 1156–1160.
- Latifi, S.M., Fathi, M., Sharifnabi, A., and Varshosaz, J., 2017, In vitro characterisation of a sol–gel derived in situ silica-coated silicate and carbonate co-doped hydroxyapatite nanopowder for bone grafting, *Mater. Sci. Eng. C*, 75, 272–278.
- Li, K., Shen, Q., Xie, Y., You, M., Huang, L., and Zheng, X., 2017, Incorporation of cerium oxide into hydroxyapatite coating protects bone marrow stromal cells against H<sub>2</sub>O<sub>2</sub>-induced inhibition of osteogenic differentiation, *Biol. Trace Elem. Res.*, 1–14.
- Li, M., Liu, Xingyan, Liu, Xudong, and Ge, B., 2010, Calcium phosphate cement with BMP-2-loaded gelatin microspheres enhances bone healing in osteoporosis: A pilot study, *Clin. Orthop. Relat. Res.*, 468, 1978–1985.
- Li, Y., Tjandra, W., and Tam, K.C., 2008, Synthesis and characterization of nanoporous hydroxyapatite using cationic surfactants as templates, *Mater. Res. Bull.*, 43, 2318–2326.
- Liu, Q., Cen, L., Yin, S., Chen, L., Liu, G., Chang, J., and Cui, L., 2008, A comparative study of proliferation and osteogenic differentiation of adipose-

- derived stem cells on akermanite and  $\beta$ -TCP ceramics, *Biomaterials*, 29, 4792–4799.
- Liying, H.E., Yumin, S.U., Lanhong, J., and Shikao, S.H.I., 2015, Recent advances of cerium oxide nanoparticles in synthesis, luminescence and biomedical studies: A review, *J. Rare Earths*, 33, 791–799.
- Lo, T., 2006, Growth of hydroxyapatite in a biocompatible mesoporous ordered silica, 2, 173–179.
- Looker, A.C., Sarafrazi Isfahani, N., Fan, B., and Shepherd, J.A., 2017, Trends in osteoporosis and low bone mass in older US adults, 2005–2006 through 2013–2014, *Osteoporos. Int.*, 28, 1979–1988.
- Lozano, I.B., Roman-Lopez, J., Sosa, R., Díaz-Góngora, J.A.I., and Azorín, J., 2016, Preparation of cerium doped calcium pyrophosphate: Study of luminescent behavior, *J. Lumin.*, 173, 5–10.
- Lutterotti, L., Matthies, S., and Wenk, H.-R., 1999, MAUD: A friendly java program for material analysis using diffraction, *News. CPD*, 21, 14–15.
- Ma, G. and Liu, X.Y., 2009, Hydroxyapatite: Hexagonal or monoclinic?, *Cryst. Growth Des.*, 9, 2991–2994.
- Malakauskaite-Petruleviciene, M., Stankeviciute, Z., Niaura, G., Prichodko, A., and Kareiva, A., 2015, Synthesis and characterization of sol-gel derived calcium hydroxyapatite thin films spin-coated on silicon substrate, *Ceram. Int.*, 41, 7421–7428.
- Markovic, Z. and Trajkovic, V., 2008, Biomedical potential of the reactive oxygen species generation and quenching by fullerenes (C<sub>60</sub>), *Biomaterials*, 29, 3561–3573.
- McCloskey, E. V., Johansson, H., Harvey, N.C., Compston, J., and Kanis, J.A., 2017, Access to fracture risk assessment by FRAX and linked National Osteoporosis Guideline Group (NOGG) guidance in the UK—an analysis of anonymous website activity, *Osteoporos. Int.*, 28, 71–76.
- Merkys, A., Vaitkus, A., Butkus, J., Okulič-Kazarinas, M., Kairys, V., and Gražulis, S., 2016, COD::CIF::Parser: An error-correcting CIF parser for the Perl language, *J. Appl. Crystallogr.*, 49, 292–301.
- Miao, X., Lim, W., Huang, X., and Chen, Y., 2005, Preparation and characterization of interpenetrating phased TCP/HA/PLGA composites, *Mater. Lett.*, 59, 4000–4005.
- Montero, M.L., Saenz, A., Rodriguez, J.G., Arenas, J., and Castano, V.M., 2006, Electrochemical synthesis of nanosized hydroxyapatite, *J. Mater. Sci. Lett.*, 41, 2141–2144.
- Motisuke, M., Santos, V.R., Bazanini, N.C., and Bertran, C.A., 2014, Apatite bone cement reinforced with calcium silicate fibers, *J. Mater. Sci. Mater. Med.*, 25, 2357–2363.
- Naganuma, T. and Traversa, E., 2014, The effect of cerium valence states at cerium oxide nanoparticle surfaces on cell proliferation, *Biomaterials*, 35, 4441–4453.
- Nakano, M., Hirano, N., Matsuura, K., Watanabe, H., Kitagawa, H., Ishirara, H., and Kawaguchi, Y., 2002, Percutaneous transpedicular vertebroplasty with calcium phosphate cement in the treatment of osteoporotic vertebral compression and burst fractures, *J. Neurosurg.*, 97, 287–293.

- Nayak, J. and Bera, J., 2009, A simple method for production of humidity indicating silica gel from rice husk ash, *J. Met. Mater. Miner.*, 19, 15–19.
- Nurhasanah, I., Safitri, W., Arifin, Z., Subagio, A., and Windarti, T., 2018, Antioxidant activity and dose enhancement factor of CeO<sub>2</sub> nanoparticles synthesized by precipitation method, *IOP Conf. Ser. Mater. Sci. Eng.*, 432, .
- Onodera, J., Kondo, E., and Omizu, N., 2014, Beta-tricalcium phosphate shows superior absorption rate and osteoconductivity compared to hydroxyapatite in open-wedge high tibial osteotomy, *Knee Surg Sport. Traumatol Arthrosc*, 22, 2763–2770.
- Ozdemir, F., Evans, I., and Bretcanu, O., 2017, Calcium phosphate cements for medical applications,. In, Kaur,G. (ed), *Clinical applications of biomaterials: State-of-the-art progress, trends, and novel approaches*. Springer Nature, Cham, pp. 91–122.
- Pajchel, L. and Kolodziejski, W., 2018, Synthesis and characterization of MCM-48/hydroxyapatite composites for drug delivery: Ibuprofen incorporation, location and release studies, *Mater. Sci. Eng. C*, 91, 734–742.
- Pandey, A., Midha, S., Kumar, R., Maurya, R., and Kumar, V., 2018, Antioxidant and antibacterial hydroxyapatite-based biocomposite for orthopedic applications, *Mater. Sci. Eng. C*, 88, 13–24.
- Paschalis, E.P., Gamsjaeger, S., Hassler, N., Fahrleitner-Pammer, A., Dobnig, H., Stepan, J.J., Pavo, I., Eriksen, E.F., and Klaushofer, K., 2017, Vitamin D and calcium supplementation for three years in postmenopausal osteoporosis significantly alters bone mineral and organic matrix quality, *Bone*, 95, 41–46.
- Phatai, P., Futralan, C.M., Utara, S., Khemthong, P., and Kamonwannasit, S., 2018, Structural characterization of cerium-doped hydroxyapatite nanoparticles synthesized by an ultrasonic-assisted sol-gel technique, *Results Phys.*, 10, 956–963.
- Pode, R., 2016, Potential applications of rice husk ash waste from rice husk biomass power plant, *Renew. Sustain. Energy Rev.*, 53, 1468–1485.
- Prasetyaningrum, P.W., Bahtiar, A., and Hayun, H., 2018, Synthesis and cytotoxicity evaluation of novel asymmetrical mono-carbonyl analogs of curcumin (AMACs) against vero, HeLa, and MCF7 cell lines, *Sci. Pharm.*, 86, 1–13.
- Priyadarshini, B., Anjaneyulu, U., and Vijayalakshmi, V., 2017, Preparation and characterization of sol-gel derived Ce<sup>4+</sup> doped hydroxyapatite and its in vitro biological evaluations for orthopedic applications, *Mater. Des.*, 119, 446–455.
- Quirós, M., Gražulis, S., Girdzijauskaitė, S., Merkys, A., and Vaitkus, A., 2018, Using SMILES strings for the description of chemical connectivity in the Crystallography Open Database, *J. Cheminform.*, 10, 1–17.
- Rao, R.R., Roopa, H.N., and Kannan, T.S., 1997, Solid state synthesis and thermal stability of HAP and HAP-β-TCP composite ceramic powders, *J. Mater. Sci. Med.*, 8, 511–518.
- Rodrigues, L.R., Gilda, C., Tavares, B., Jorge, F., and Monteiro, M., 2011, Synthesis of HA and beta-TCP using sol-gel process and analysis with FTIR,. In, *Proceedings of COBEM 2011.*, pp. 1–5.
- Sanda, M., Shiota, M., Fujii, M., Kon, K., Fujimori, T., and Kasugai, S., 2014,

- Capability of new bone formation with a mixture of hydroxyapatite and beta-tricalcium phosphate granules, *Clin. Oral Implants Res.*, 1–6.
- Shadjou, N. and Hasanzadeh, M., 2015, Bone tissue engineering using silica-based mesoporous nanobiomaterials: Recent progress, *Mater. Sci. Eng. C*, 55, 401–409.
- Shiba, K., Motozuka, S., Yamaguchi, T., Ogawa, N., Otsuka, Y., Ohnuma, K., Kataoka, T., and Tagaya, M., 2015, Effect of cationic surfactant micelles on hydroxyapatite nanocrystal formation: An investigation into the inorganic–organic interfacial interactions, *Cryst. Growth Des.*, A-I.
- Su, C.C., Kao, C.T., Hung, C.J., Chen, Y.J., Huang, T.H., and Shie, M.Y., 2014, Regulation of physicochemical properties, osteogenesis activity, and fibroblast growth factor-2 release ability of  $\beta$ -tricalcium phosphate for bone cement by calcium silicate, *Mater. Sci. Eng. C*, 37, 156–163.
- Szilágyi, B., Muntean, N., Barabás, R., Ponta, O., and Lakatos, B.G., 2015, Reaction precipitation of amorphous calcium phosphate: Population balance modelling and kinetics, *Chem. Eng. Res. Des.*, 93, 278–286.
- Tai, S., Cheng, J.Y., Ishii, H., Akimoto, S., Satoh, T., Yamamoto, K., Nakajima, T., Karaki, S., Suzuki, E., Yamaguchi, K., and Maruyama, K., 2014, Characterization of beta-tricalcium phosphate as a novel immunomodulator, *Int. Immunopharmacol.*, 19, 45–51.
- Thompson, L., 2014, The human skeleton, *slideplayer.com*, 1.
- Torres, P.M.C., Gouveia, S., Olhero, S., Kaushal, A., and Ferreira, J.M.F., 2015, Injectability of calcium phosphate pastes: Effects of particle size and state of aggregation of  $\beta$ -tricalcium phosphate powders, *Acta Biomater.*, 21, 204–216.
- Umadevi, N. and Geethalakshmi, S.N., 2011, A brief study on human bone anatomy and bone fractures, *IJCES Int. J. Comput. Eng. Sci.*, 1, 93–104.
- Van der Velde, R.Y., Wyers, C.E., Teesselink, E., Geusens, P.P.M.M., Van den Bergh, J.P.W., De Vries, F., Cooper, C., Harvey, N.C., and Van Staa, T.P., 2017, Trends in oral anti-osteoporosis drug prescription in the United Kingdom between 1990 and 2012: Variation by age, sex, geographic location and ethnicity, *Bone*, 94, 50–55.
- Verma, N.P. and Sinha, A., 2013, Effect of solid to liquid ratio on the physical properties of injectable nanohydroxyapatite, *J. Mater. Sci. Mater. Med.*, 24, 53–59.
- Villacampa, A.I. and Ma, J., 2000, Synthesis of a new hydroxyapatite-silica composite material, *J. Cryst. Growth*, 211, 111–115.
- Van den Vreken, N.M.F., Pieters, I.Y., Declercq, H.A., Cornelissen, M.J., and Verbeeck, R.M.H., 2010, Characterization of calcium phosphate cements modified by addition of amorphous calcium phosphate, *Acta Biomater.*, 6, 617–625.
- Wang, H., Zhai, L., Li, Y., and Shi, T., 2008, Preparation of irregular mesoporous hydroxyapatite, *Mater. Res. Bull.*, 43, 1607–1614.
- Wilson, L.M., Rebholz, C.M., Jirru, E., Liu, M.C., Zhang, A., Gayleard, J., Chu, Y., and Robinson, K.A., 2017, Benefits and harms of osteoporosis medications in patients with chronic kidney disease: A systematic review and meta-analysis, *Ann. Intern. Med.*, 166, 649–658.

- Windarti, T., Darmawan, A., and Marliana, A., 2019, Synthesis of  $\beta$ -TCP by sol-gel method: Variation of Ca/P molar ratio, *IOP Conf. Ser. Mater. Sci. Eng.*, 509, 012147.
- Witoon, T., Chareonpanich, M., and Limtrakul, J., 2010, Size control of nanostructured silica using chitosan template and fractal geometry: Effect of chitosan/silica ratio and aging temperature, *J. Sol-Gel Sci. Technol.*, 56, 270–277.
- Xiao, F., Ye, J., Wang, Y., and Rao, P., 2005, Deagglomeration of HA during the precipitation, *J. Mater. Sci.*, 40, 5439–5442.
- Yamada, S., Nishikawa, M., and Tagaya, M., 2018, Mesoporous silica formation on hydroxyapatite nanoparticles, *Mater. Lett.*, 211, 220–224.
- Yamamoto, M., Hokugo, A., Takahashi, Y., Nakano, T., Hiraoka, M., and Tabata, Y., 2015, Combination of BMP-2-releasing gelatin/ $\beta$ -TCP sponges with autologous bone marrow for bone regeneration of X-ray-irradiated rabbit ulnar defects, *Biomaterials*, 56, 18–25.
- Yashima, M., Sakai, A.A., Kamiyama, T., and Hoshikawa, A., 2003, Crystal structure analysis of  $\beta$ -tricalcium phosphate  $\text{Ca}_3(\text{PO}_4)_2$  by neutron powder diffraction, *J. Solid State Chem.*, 175, 272–277.
- Yeong, K.C.B., Wang, J., and Ng, S.C., 2001, Mechanochemical synthesis of nanocrystalline hydroxyapatite from CaO and CaHPO, *Biomaterials*, 22, 2705–2712.
- Yousefpour, M. and Taherian, Z., 2013, The effects of ageing time on the microstructure and properties of mesoporous silica-hydroxyapatite nanocomposite, *Superlattices Microstruct.*, 54, 78–86.
- Zerbo, I.R., Bronckers, A.L.J.J., Lange, G. De, and Burger, E.H., 2005, Localisation of osteogenic and osteoclastic cells in porous  $\beta$ -tricalcium phosphate particles used for human maxillary sinus floor elevation, *Biomaterials*, 26, 1445–1451.
- Zhang, J., Liu, W., Schnitzler, V., Tancrét, F., and Bouler, J.M., 2014, Calcium phosphate cements for bone substitution: Chemistry, handling and mechanical properties, *Acta Biomater.*, 10, 1035–1049.
- Zhou, G., Li, Y., Zheng, B., Wang, W., Gao, J., Wei, H., Li, S., Wang, S., and Zhang, J., 2014, Cerium oxide nanoparticles protect primary osteoblasts against hydrogen peroxide induced oxidative damage, *Micro Nano Lett. IET*, 9, 91–96.
- Zhu, G., Zhao, R., Li, Y., and Tang, R., 2016, Multifunctional Gd,Ce,Tb co-doped  $\beta$ -tricalcium phosphate porous nanospheres for sustained drug release and bioimaging, *J. Mater. Chem. B*, 4, 3903–3910.

