Georgia Institute of Technology,
George W. Woodruff School of Mechanical Engineering,
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Ramesh Subbiah

Research Interests

Tissue engineering and regenerative medicine, Stem cell differentiation, Extracellular matrices, Microcapsules, Nanoparticles, Growth factors delivery, Biomechanics, Cell migration, Wound healing, 3D scaffold, Stiffness tunable materials, Tough hydrogel, Cell bridging-stacking, Atomic force microscopy

Education

Ph.D. Biomedical Engineering, Aug 2011 - Aug 2016
Korea University of Science and Technology /Korea Institute of Science and Technology (UST/KIST), South Korea
Thesis: Engineered Extracellular Microenvironments for Cell Differentiation and Tissue Regeneration Application
Advisor: Kwideok Park

Master of Science, Biomedical Engineering, Mar 2009 - Feb 2011
Gachon University, South Korea
Thesis: Fabrication of Bio-Nanofilm for Biomedical Applications
Advisor: Kyusik Yun

Bachelor of Pharmacy, Aug 2001 - Aug 2005
KMCH College of Pharmacy, Dr. MGR Medical University, Tamil Nadu, India
Thesis: Synthesis, Characterization and Antimicrobial studies of some 1, 2, 4-Triazole derivatives
Advisor: P. R. Vijay Anand

Work History

Postdoctoral Fellow, April 2017 - Present
George W. Woodruff School of Mechanical Engineering, Georgia Institute of Technology, Atlanta, USA
Advisor: Robert E. Guldberg, Andres J. Garcia
* Designing research study of dual growth factors delivery to combat composite non-union bone defect
* Help managing AFIRM and RO1 projects.
* Co-PI for IACUC protocols (#A16075, #A18049)
* Lab management (Chematix, Quartzy)

Postdoctoral Fellow, Oct 2016 – Jan 2017
School of Integrative Engineering, Chung-Ang University, South Korea
Advisors: Hansoo Park and Kwideok Park
* Managing tough hydrogel project received by Kwideok Park
* Mentoring PhD students

Research Assistant, Mar 2012 – Aug 2016
Center for Biomaterials, Korea Institute of Science and Technology (KIST), Seoul, South Korea
Advisor: Kwideok Park
* Investigation of stiffness tunable cell-derived extracellular matrices for cell differentiation study
* Dual growth factors controlled delivery using microcapsules for regeneration of vascularized bone tissue

Visiting Scientist, Mar 2011 – Feb 2012
Center for Nanophotonics, Korea Institute of Science and Technology (KIST), Seoul, South Korea
Advisors: Kyoungjin Choi
* InP/ZnS quantum dots synthesis, and fabrication and characterization of electrospun nanofibers
* Determination of nanomaterials toxicity and cytomechanics analysis

Marketing, Sep 2005 - Jan 2009
Pulmonary and Critical Care Medicine (PACC), (KIST), GlaxoSmithKline (GSK) Pharmaceuticals Ltd, India
Advisors: K. B. Sundar and S. Suresh Kumar

Publications and Conference proceedings

Invited Speaker

Engineered Extracellular Microenvironments for Cell Differentiation and Tissue Regeneration Applications

1. The 2nd International Conference & Exhibition on Indonesian Medical Education & Research Institute, Faculty of Medicine, Universitas Indonesia, Jakarta, Indonesia, 2017.
2. Department of Biotechnology, Manonmaniam Sundaranar University, Tamil Nadu, India, 2017.

Oral Presentations

1. Multiple Growth Factor Loading Strategy Affects Spatiotemporal Release from Heparin Microparticles, Annual meeting & exposition - Society For Biomaterials, Atlanta, GA, USA 2018.
2. Tunable Cell-derived Extracellular Matrices Guide Stem Cell Fate, The 17th International Annual Meeting of Korean Tissue Engineering and Regenerative Medicine Society (KTERMS), Seoul, South Korea, 2016.
3. In situ delivery of BMP-2 And VEGF for osteogenesis of mesenchymal stem cells and bone regeneration in rat calvarial defect model, TERMIS-AP, Daegu, South Korea, 2014.

4. Investigation of dual growth factors delivery on osteogenesis and angiogenesis, International Biomedical Engineering Conference (IBEC), Gwangju, South Korea, 2014.
5. A novel construction of CNT-Silver nanoparticles-DNA/POSS/PVA nanostructure as a multifunctional tool for nanotechnology, Nanoscience and nanotechnology in chemistry, health, environment and energy, NATCHEE, Agra, India, 2010.

Peer-Reviewed Publications

1. Da Costa ADS and Subbiah R et al., xxxx. xxxx., xx, xx-xx (xxxx). In Preparation
2. Subbiah R et and Guldberg RE., Materials Science and Design Principles of Growth Factor Delivery Systems in Tissue Engineering and Regenerative Medicine, Adv. Healtc Mater., In Press.
3. Park M and Subbiah R et al., The three dimensional cues-integrated-biomaterial potentiates differentiation of human mesenchymal stem cells. Carbohyd. Polym., In Press.
4. Jeon S, **Subbiah R,*** Bonaedy T, Van S, Park K, Yun K.* Surface Functionalized Magnetic Nanoparticles Shift Cell Behavior with On/Off Magnetic Fields. J Cell Physiol., 233:2, 1168-1178 (2018). **[*co-corresponding authors]**
5. Kim IG, Gil C-H, Seo J, Park S-J, **Subbiah R**, Jung T-H, Kim JS, Jeong Y-H, Chung H-M, Lee JH, Lee MR, Moon S-H, Park K. Mechanotransduction of human pluripotent stem cells cultivated on tunable cell-derived extracellular matrix. Biomaterials 150, 100-111 (2018).
6. Elnaggar MA, **Subbiah R**, Han DK, Joung YK. Lipid-based carriers for controlled delivery of nitric oxide. Expert Opin. Drug Deliv., 14:12, 1341-1353 (2017). Review article
7. Suhaeri M, **Subbiah R**, Kim SH, Kim CH, Oh SJ, Kim SH, Park K. A novel platform of cardiomyocytes culture and coculture via fibroblast-derived matrix-coupled aligned electrospun nanofiber. ACS Appl. Mater. Interfaces 9:1, 224-235 (2017).
8. **Subbiah R***, Hwang MP*, Du P, Suhaeri M, Hwang J-H, Hong J-H, Park K. Tunable crosslinked cell-derived extracellular matrix guides cell fate. Macromol. Biosci., 16:11, 1723-1734 (2016).
9. Hwang MP, **Subbiah R**, Kim IG, Lee KE, Park J, Kim SH, Park K. Approximating bone ECM: Crosslinking directs individual and coupled osteoblast/osteoclast behavior. Biomaterials 103, 22-32 (2016).
10. Manoj M, **Subbiah R**, Meena P, Mangalaraj D, Ponpandian N, Viswanathan C, Park K. Green Synthesis and Characterization of Bioceramic Hydroxyapatite (HAp) Nanosheets and Its Cellular Study. Adv. Sci. Eng. Med., 8, 216 (2016).
11. Dhandapani VS, **Subbiah R**, Thangavel E, Arumugam M, Park K, Gasem ZM, Veeraraghavan V, Kim DE. Tribological properties, corrosion resistance and biocompatibility of magnetron sputtered Titanium-amorphous Carbon coatings. Appl. Suf. Sci., 371, 262-274 (2016).
12. Du P, Suhaeri M, **Subbiah R**, Van SY, Park J, Kim SH, Park K, Lee K. Elasticity modulation of fibroblast-derived matrix for endothelial cell vascular morphogenesis and mesenchymal stem cell differentiation. Tissue Eng. Part A 22:5-6, 415-426 (2016).
13. **Subbiah R**, Jeon SB, Park K, Ahn SJ, Yun K. Investigation of cellular responses upon interaction with silver nanoparticles. Int. J. Nanomedicine 10, 191-201 (2015).
14. Manoj M, **Subbiah R**, Mangalaraj D, Ponpandian N, Viswanathan C, Park K. Influence of Growth Parameters on the Formation of Hydroxyapatite (HAp) Nanostructures and Their Cell Viability Studies. Nanobiomedicine 2 (2015).
15. **Subbiah R**, Suhaeri M, Hwang MP, Kim W, Park K. Investigation of the changes of biophysical/mechanical characteristics of differentiating preosteoblasts in vitro. Biomater. Res., 19:1, 24 (2015).
16. Suhaeri M, **Subbiah R**, Van SY, Du P, Kim IG, Lee K, Park K. Cardiomyoblast (h9c2) differentiation on tunable extracellular matrix microenvironment. Tissue Eng. Part A 212:11-12, 1940-1951 (2015).
17. S**ubbiah R**, Hwang MP, Van SY, Do SH, Park H, Lee K, Kim SH, Yun K, Park K. Osteogenic/Angiogenic dual growth factor delivery microcapsules for regeneration of vascularized bone tissue. Adv. Healtc Mater., 4:13, 1982-1992 (2015).
18. **Subbiah R**, Du P, Van SY, Muhammad S, Hwang MP, Lee K, Park K. Fibronectin-tethered graphene oxide as an artificial matrix for osteogenesis. Biomed. Mater., 9:6, 065003 (2014).
19. Du P, Hwang MP, Noh YK, **Subbiah R**, Kim IG, Bae SE, Park K. Fibroblast-derived matrix (FDM) as a novel vascular endothelial growth factor delivery platform. J. Control. Release 194, 122-129 (2014).
20. Du P, **Subbiah R**, Park JH, Park K. Vascular morphogenesis of human umbilical vein endothelial cells on cell-derived macromolecular matrix microenvironment. Tissue Eng. Part A 20:17-18, 2365-2377 (2014).
21. S**ubbiah R**, Du P, Hwang MP, Kim IG, Van SY, Noh YK, Park H, Park K. Dual growth factor-loaded core-shell polymer microcapsules can promote osteogenesis and angiogenesis. Macromol. Res., 22:12, 1320-1329 (2014).
22. **Subbiah R**, Ramasundaram S, Du P, Hyojin K, Sung D, Park K, Lee N-E, Yun K, Choi KJ. Evaluation of cytotoxicity, biophysics and biomechanics of cells treated with functionalized hybrid nanomaterials. J. R. Soc. Interfac., 10:88, 20130694 (2013).
23. Choi DH,* **Subbiah R**,* Kim IH, Han DK, Park K. Dual Growth Factor Delivery Using Biocompatible Core–Shell Microcapsules for Angiogenesis. Small 9:20, 3468-3476 (2013).
24. Samal M, Mohapatra P, **Subbiah R**, Lee C-L, Anass B, Kim JA, Kim T, Yi DK. InP/ZnS–graphene oxide and reduced graphene oxide nanocomposites as fascinating materials for potential optoelectronic applications. Nanoscale 5:20, 9793-9805 (2013).
25. **Subbiah R**,* Ramalingam P,* Ramasundaram S, Kim DY, Park K, Ramasamy MK, Choi KJ. N, N, N-Trimethyl Chitosan Nanoparticles for Controlled Intranasal Delivery of HBV Surface Antigen. Carbohydr. Polym., 89:4, 1289-1297 (2012) **[*co-first authors]**.
26. Sadhasivam S, Shanmugam P, Veerapandian M, **Subbiah R**, Yun K. Biogenic synthesis of multidimensional gold nanoparticles assisted by Streptomyces hygroscopicus and its electrochemical and antibacterial properties. Biometals 25:2, 351-360 (2012).
27. Veerapandian M, **Subbiah R**, Lim GS, Park SH, Yun K, Lee MH. Copper-glucosamine microcubes: synthesis, characterization, and C-reactive protein detection. Langmuir 27:14, 8934-8942 (2011).
28. **Subbiah R**, Veerapandian M, Sadhasivam S, Yun K. Triad CNT-NPs/polymer Nanocomposites: Fabrication, Characterization, and Preliminary Antimicrobial Study. Synth. React. Inorg. Metal-Org. nano-Met. Chem., 41:4, 345-355 (2011).
29. **Subbiah** R, Lee H, Veerapandian M, Sadhasivam S, Seo SW, Yun K. Structural and biological evaluation of a multifunctional SWCNT-AgNPs-DNA/PVA bio-nanofilm. Anal Bioanal Chem. 400:547-60 (2011).
30. **Subbiah R**, Veerapandian M, Yun K. Nanoparticles: Functionalization and Multifunctional Applications in Biomedical Sciences. Curr. Med. Chem., 17:4559 (2010). Review article
31. Book Chapter 4. Koo H, Yhee J, Kwon IC, Kim K, Subbiah R. Polymeric Nanoparticles in Cancer Therapy; Book Chapter 12. Veerapandian M, Yun K, Subbiah R, Lee M-H. Cytotoxicity of Biosynthesized Nanomaterials and Functionalized Nanomaterials: Use in Therapy. Nanobiomaterials: Development and Applications, CRC Press, Taylor and Francis Publications (2013).
32. Book Chapter 4. Veerapandian M, Sadhasivam S, Subbiah R, Yun K. Functional Nanomaterials for Biomedical Research: Focus on Bio-Functionalization, Biosynthesis and Biomedical Application, Bio-Nanotechnology. A Revolution in Food, Biomedical and Health Sciences. Hui: Food Science and Technology. CRC Press, Taylor and Francis Publications (2013)

Academic Metrices

	Google scholar	Scopus	Publons	Updated
Publications	37	30	-	Sep 25th 2018
Citations	555	409	-	
h-index	14	11	-	
Articles reviewed	-	-	20	

Skills

Equipment

Atomic force microscopy (Nanowizard II), Scanning electron microscopy (Jeol), Zeta potential/particle size analyzer (DLS), MicroCT (Skyscan 1172), Glove box, Mechanical testing system (Instron), Confocal microscopy (Carl-Zeiss), Live-cell microscopy (Carl-Zeiss), Transmission electron microscopy (Technai), Electrospinning (NanoNC)

Chemical/Material

Nano/Micro-particles/capsules/fiber synthesis, Cell-derived ECM preparation, Scaffold development using synthetic/natural polymers, Self-assembled monolayer, Controlled delivery of protein/small molecules from particulate system, Cross-linking and particles functionalization, Emulsification using ultrasonication, Fractal cut scaffolds

Molecular Biology

PCR/Primer design, DNA/RNA extraction, Quantitative PCR, Gel electrophoresis

Biological

Primary/cell-line culture, Bacterial culture Isolation/Differentiation of cells, Animal surgery (Calvarial and segmental bone defect), Various biological assays

Miscellaneous

Immunocytochemistry, ELISA, ImageJ, Imaris (Bitplane), CorelDraw, GraphPad (Prism)

Honors & Fellowships

Best Oral Presentation and Poster Award

1. 2016 KTERMS Conference
   Tunable Cell-derived Extracellular Matrices Guide Stem Cell Fate
2. 2015 UST Conference
   Dual growth factors delivery on vascularized bone regeneration
3. 2014 Korean Society of Biomaterials Conference
   Dual growth factors delivery on vascularized bone regeneration
4. 2013 KTERMS Conference
   Fabrication of graphene oxide-based matrices and their effect on osteogenic differentiation of preosteoblasts

Awards

1. Full scholarship from the Ministry of Science and Technology (UST) for PhD, Korea
2. Outstanding research participation award from KIST, Korea, 2016
3. Academic excellence award from KIST, Korea, 2016
   Excellence award from UST, Korea 2016
4. Research Paper award from UST, Korea, 2016
5. Award of Excellence for Exhibition and Performance – 2013, KIST
6. Excellence in Mentoring Award – 2015, UST, Daejon, Korea
7. Recipient of UST Overseas Exchange Program travel scholarship to attend 2015 TERMIS - World Congress, Boston, Massachusetts, USA.
8. Recipient of KIST conference travel scholarship to attend 2013 TERMIS – EU, Istanbul, Turkey.
9. Super Star award, GSK, 2008, 111% performance in the year 2007-2008
10. Star award, GSK, 2007, 103% performance in the year 2006-2007
11. Best promoter of antibiotics (Augmentin and Timentin) 2006 and 2007 consecutively
12. 2nd learning know-how essay contest – 2015, UST, Daejon, Korea

Mentoring

1. Cininta savitri, PhD candidate at Dr. Kwideok Park Lab, KIST, Seoul, South Korea
2. Avelino Dos Santos Da Costa, PhD candidate at Dr. Insuk Choi lab, KIST, Seoul, South Korea
3. Seong Beom Jeon, MS candidate at Dr. Kyusik Yun Lab, Gachon University, Seongnam, South Korea
4. Sumin Jin, PhD candidate at UST-KIST, Seoul, South Korea

Leadership Experience

1. President for International Students Representative, 2012-2016, KIST-IRDA, Seoul, South Korea.
2. President of "Dr. Kalam's Society for Research-STIMULATE", an organization aims to educate students with less access to the mainstream.

Reviewer

1. Biomedical Materials (IOP Science).
2. Nanotechnology (IOP Science).
3. Biomedical Engineering online (Springer Nature).
4. Biomedical Physics and Engineering Express (IOP Science)
5. Tissue engineering and regenerative medicine (Springer).
6. Acta Biomaterialia (Elsevier).
7. Advances in Tissue Engineering & Regenerative Medicine (MedCrave group).
8. Journal of Stem Cell Research & Therapeutics (MedCrave group).
9. Journal of Tissue engineering (SAGE publishing).

10. Journal of Controlled Release (Elsevier)

Editor

1. Journal of Medicines Development Sciences (WHIOCE Publishing PTE LTD)
2. Journal of Biomolecular Research & Therapeutics (OMICS International)

Supervisors (References)

1. Robert E. Guldberg, Ph. D. Professor and Director,
   Knight Campus for Accelerating Scientific Impact, 6231 University of Oregon,
   Eugene, Oregon 97403, U.S.A.
   Email: robert.guldberg@ibb.gatech.edu; Tel: +1-404-894-6589

2. Kwideok Park, Ph. D. Principal Research Scientist/Professor,
   Center for Biomaterials, Biomedical Research Institute, Korea Institute of Science and Technology (KIST),
   Hwarangno 14-gil 5, Seongbuk-gu, Seoul 136-791, Korea
   Email: kpark@kist.re.kr; Tel: +82-2-958-5288; HP: +82-10-4570-1928

3. Kyoung-Jin Choi, Ph.D. Associate Professor,
   School of Mechanical and Advanced Materials Engineering, Ulsan National Institute of Science and Technology (UNIST),
   50 UNIST-gil, Eonyang-eup, Ulju-gun, Ulsan, Korea
   E-mail: choi@unist.ac.kr; Tel: +82-52-217-2337; HP: +82-10-6397-6905

4. Kyusik Yun, Ph. D. Professor,
   Department of Bionanotechnology, Gachon University,
   1342 Seongnam-daero, Sujeong-gu, Seongnam-si, Gyeonggi-do, Korea
   Email: ykyusik@gachon.ac.kr; Tel: +82-31-750-8753; HP: +82-10-6220-5227

5. Kangwon Lee, Ph. D. Assistant Professor,
   Department of Transdisciplinary Studies, Graduate School of Convergence Science and Technology,
   Seoul National University, Seoul, Korea
   Email: kangwonlee@snu.ac.kr; Tel: +82-31-888-9145; HP: +82-10-4107-7595

6. Insuk Choi, Ph. D. Associate Professor,
   Department of Materials Science and Engineering, Seoul National University,
   Hwarangno 14-gil 5, Seongbuk-gu, Seoul 136-791, Korea
   Email: insukchoi@kist.re.kr; Tel: +82-2-958-6622