

Dr. Anju R. Babu

Assistant Professor,
Department of Biotechnology & Medical Engineering,
National Institute of Technology Rourkela, Odisha, India 769008
Contact: 08136859318, 0661-2462298
anjurbabu@gmail.com, babua@nitrkl.ac.in
| ORCID ID : 0000-0003-2259-5896

RESEARCH INTEREST

- Soft Tissue Biomechanics
- Systems Biology
- Nanotechnology
- Tissue Engineering

EDUCATION

Ph.D.		Indian Institute of Science Bangalore	2009–2015
M. Tech	Nanomedical Sciences	Amrita Center for Nanosciences, Kochi, Kerala	2007–2009
B. Tech	Biomedical Engineering	Sahrdaya College of Engineering, Kerala	2002–2004

PROFESSIONAL EXPERIENCE

Assistant Professor	Department of Biotechnology & Medical Engineering National Institute of Technology Rourkela	March 2018 – Present
Postdoctoral Fellow	Biomechanics and Biomaterials Design Laboratory, University of Oklahoma, USA	October 2017– March 2018
Postdoctoral Fellow	Institute of Biomechanics, Technical University of Graz, Austria	May 2015–April 2017
Service Engineer	Trivitron Diagnostics Pvt Ltd, Chennai	September 2006–September 2007

TEACHING EXPERIENCE

- Artificial Organs and Rehabilitation Engineering (PG, Spring 2022-23, 2021-22, 2020-21)
- Biomechanics Laboratory (PG, Spring 2022-23, 2021-22, 2020-21)
- Nanobiotechnology (UG, Autumn 2023-24, 2022-23, 2021-22, 2020-21, 2019-20, 2018-19)
- Transport Processes in Biological System (UG, Spring 2022-23, 2021-22, 2020-21, 2019-20, 2018-19)
- Analog and Digital Electronics for Bioengineers (UG, Autumn 2018-19)
- Application of MATLAB in Bioengineering Laboratory (UG, Autumn 2018-19)
- Biomedical Image Processing (UG, Spring 2019-20)
- Biomedical Instrumentation (UG, Autumn 2018-19)
- Artificial Organs and Rehabilitation Engineering (UG, Spring 2018-19)
- Biomedical Signal Processing Laboratory (UG, Autumn 2023-24, 2022-23, 2021-22, 2020-21, 2019-20)
- Biomedical Image Processing Laboratory (UG, Spring 2019-20)
- Biomedical Instrumentation Laboratory (UG, Autumn 2019-20)

SUPERVISED PROJECT

Courses	Thesis Submitted	Graduated	Ongoing
PhD	1	-	3
PG	-	7	2
UG	-	12	3

PUBLICATIONS

Journal Publications

- Deepak, T., Bharat, B.S. and **Babu, A. R.**, 2023. Evaluation of physicochemical properties of graphene oxide-decellularized pericardium biohybrid scaffold. *Journal of Biomedical Materials Research Part B: Applied Biomaterials*, 1-11.
- Mohanta, M., Ramdhun, Y., Thirugnanam, A., Gupta, R., Verma, D., Deepak, T. and **Babu, A. R.**, 2023. Biodegradable AZ91 magnesium alloy/sirolimus/poly D, L-lactic-co-glycolic acid-based substrate for cardiovascular device application. *Journal of Biomedical Materials Research Part B: Applied Biomaterials*, 1-21.

- Deepak, T., **Babu, A.R.** and Gupta, S.K., 2023. In vitro assessment of decellularized matrix for the cardiac tissue engineering application. *Journal of Materials Research*, pp.1-13.
- Bharat, B.S., Deepak, T. and **Babu, A.R.**, 2023. Exploring the bioactivity of reduced graphene oxide and TiO₂ nanocomposite for the regenerative medicinal applications. *Medical Engineering & Physics*, p.104061.
- Bharat, B.S., Bagde, A.D. and **Babu, A.R.**, 2023. Development of TiO₂-Based nanocomposite film for colorimetric detection of glucose. *Materials Science and Engineering: B*, 298, p.116886.
- Deepak, T., & **Babu, A. R.**, 2023. Investigation of hemocompatibility and physicochemical properties of acellular caprine pericardium for biomedical applications. *Journal of Materials Research*, 38, 1973–1983.
- Deepak, T., & **Babu, A. R.**, 2022. A review of current approaches for decellularization, sterilization, and hemocompatibility testing on xenogeneic pericardium. *Materials Today Communications*, 104478.
- Are, R. P., & **Babu, A. R.**, 2022. Molecular interaction analysis of SPARC-collagen with human serum albumin. *Journal of Computational Biophysics and Chemistry*, 21(8), 927-939.
- Niestrawska, J. A., Pukaluk, A., **Babu, A. R.**, & Holzapfel, G. A., 2022. Differences in collagen fiber diameter and waviness between healthy and aneurysmal abdominal aortas. *Microscopy and Microanalysis*, 1-15.
- Mallick, M., Are, R. P., & **Babu, A. R.**, 2022. An overview of collagen/bioceramic and synthetic collagen for bone tissue engineering. *Materialia*, 101391.
- Ross, C.J., Laurence, D.W., Echols, A.L., **Babu, A.R.**, Gu, T., Duginski, G.A., Johns, C.H., Mullins, B.T., Casey, K.M., Laurence, K.A. and Zhao, Y.D., 2021. Effects of enzyme-based removal of collagen and elastin constituents on the biaxial mechanical responses of porcine atrioventricular heart valve anterior leaflets. *Acta Biomaterialia*, 135, pp 425-440.
- Kramer, K.E., Ross, C.J., Laurence, D.W., **Babu, A.R.**, Wu, Y., Towner, R.A., Mir, A., Burkhart, H.M., Holzapfel, G.A. and Lee, C.H., 2019. An investigation of layer-specific tissue biomechanics of porcine atrioventricular valve anterior leaflets. *Acta Biomaterialia*, 96, pp.368-384.
- Ross, C.J., Laurence, D.W., Richardson, J., **Babu, A.R.**, Evans, L.E., Beyer, E.G., Childers, R.C., Wu, Y., Towner, R.A., Fung, K.M. and Mir, A., 2019. An investigation of the glycosaminoglycan contribution to biaxial mechanical behaviours of porcine atrioventricular heart valve leaflets. *Journal of the Royal Society Interface*, 16(156), p.20190069.
- Lee, C.H., Laurence, D.W., Ross, C.J., Kramer, K.E., **Babu, A.R.**, Johnson, E.L., Hsu, M.C., Aggarwal, A., Mir, A., Burkhart, H.M. and Towner, R.A., 2019. Mechanics of the

tricuspid valve—From clinical diagnosis/treatment, in-vivo and in-vitro investigations, to patient-specific biomechanical modeling. *Bioengineering*, 6(2), p.47.

- Niestrawska, J.A., Regitnig, P., Viertler, C., Cohnert, T.U., **Babu, A.R.** and Holzapfel, G.A., 2019. The role of tissue remodeling in mechanics and pathogenesis of abdominal aortic aneurysms. *Acta Biomaterialia*, 88, pp.149-161.
- Jett, S., Laurence, D., Kunkel, R., **Babu, A.R.**, Kramer, K., Baumwart, R., Towner, R., Wu, Y. and Lee, C.H., 2018. Biaxial mechanical data of porcine atrioventricular valve leaflets. *Data in Brief*, 21, pp.358-363.
- Jett, S., Laurence, D., Kunkel, R., **Babu, A.R.**, Kramer, K., Baumwart, R., Towner, R., Wu, Y. and Lee, C.H., 2018. An investigation of the anisotropic mechanical properties and anatomical structure of porcine atrioventricular heart valves. *Journal of the Mechanical Behavior of Biomedical Materials*, 87, pp.155-171.
- **Babu, A.R.** and Gundiah, N., 2018. Contributions of network topological structures to the mechanical properties of PDMS elastomers. *Materials Research Express*, 5(8), p.085310.
- **Babu, A.R.**, Byju, A.G. and Gundiah, N., 2015. Biomechanical properties of human ascending thoracic aortic dissections. *Journal of Biomechanical Engineering*, 137(8).
- **Babu, A.R.** and Gundiah, N., 2014. Role of crosslinking and entanglements in the mechanics of silicone networks. *Experimental Mechanics*, 54(7), pp.1177-1187.
- Gundiah, N., **Babu, A.R.** and Pruitt, L.A., 2013. Effects of elastase and collagenase on the nonlinearity and anisotropy of porcine aorta. *Physiological measurement*, 34(12), p.1657.

Book Chapters

- **Babu, A. R.**, Adharsh, R. M., & Bharat, B. S. (2022). Microfluidics-based isolation of circulating tumor cells. In *Advanced Materials for Biomedical Applications* (pp. 185-200). CRC Press.
- Deepak, T., Yamini, P., & **Babu, A. R.** (2022). Biomechanics of the Aortic Valve in Health and Disease. In *Advances in Computational Approaches in Biomechanics* (pp. 137-152). IGI Global. DOI: 10.4018/978-1-7998-9078-2.ch009

Book Edited

- Martyn P. Nash, Adam Wittek, Poul M. F. Nielsen, Magdalena Kobielarz, **Anju R. Babu**, Karol Miller, *Computational Biomechanics for Medicine Towards Automation and Robustness of Computations in the Clinic*, 2023, Springer Nature, ISBN: 978-3-031-34905-8, DOI: 10.1007/978-3-031-34906-5.

Conferences

- Manav Goenka, Deepak T, Shreya Chungroo, Devendra Verma, Anju R Babu “*Impact of Crosslinking on the Properties of Decellularized Caprine Pericardium*” International Conference on Biomedical Materials and Technology - 2023 BioTEEx 2023, IIT Delhi, December 2023.
- Drishya S, Ramakrishna Prasad Are, Anju R Babu “*Reinforced Elastomer-Based Atmospheric Water Harvesting*” International Conference on New Horizons in Biotechnology (NHBT-2023), Trivandrum, November 2023.
- Bansod Sneha Bharat, Anju R Babu, “*Reduced Graphene Oxide with Titanium Oxide-Based Nanocomposite for Regenerative Medical Application*” 3rd International Conference on Nanomaterials in Biology (ICNB 2023), IIT Gandhinagar, November, 2023.
- Bansod Sneha Bharat, Thirumalai Deepak, Ramakrishna Prasad Are, Anju R Babu “*Assessment of Antioxidant Activity and Biocompatibility of the Graphene Oxide-Based Nanocomposite Material for Tissue Engineering Applications*” 33rd Annual Conference of the European Society for Biomaterials, Davos, Switzerland, September 2023.
- Ramakrishna Prasad Are, Anju R Babu “*Role of Serum Protein Acidic and Rich in Cysteine and Human Serum Albumin in Cancer Drug Delivery*” 33rd Annual Conference of the European Society for Biomaterials, Davos, Switzerland, September 2023.
- Puneet, Ramakrishna Prasad Are, Anju R Babu “*Implementation of Machine Learning Algorithms for Breast Cancer Prediction*” Indian Conference on MedTech Innovations (ICMI). IIT Jodhpur, Feb 2023.
- Banda Sai Jaswanth Reddy, Ramakrishna Prasad Are, Puneet, Anju R Babu “*Identification of Cardiovascular Mortality Risk in Patients with Respiratory Disease*” Indian Conference on MedTech Innovations (ICMI). IIT Jodhpur, Feb 2023.
- Thirumalai Deepak, Anju R Babu “*Investigation of Hemocompatibility and Cytotoxicity of Decellularized Caprine pericardium for Tissue Engineering Applications*” International Conference on Biotechnology for Sustainable Bioresources and Bioeconomy (BSBB) IIT Guwahati, Dec 2022.
- Bansod Sneha Bharat, Thirumalai Deepak, Anju R Babu “*Synthesis and Characterization of Nanocomposite-Based Material for Wound Healing Application*” International Conference on Biotechnology for Sustainable Bioresources and Bioeconomy (BSBB) IIT Guwahati. Dec 2022.
- Ramakrishna Prasad Are, Anju R Babu “*Individual Sub-Domain Molecular Dynamics Analysis of Human Serum Albumin*” 4th International Symposium on Mechanobiology (ISMB), Sydney, Australia, Nov 2022.

- Bansod Sneha Bharat, Anju R Babu "*Synthesis of Titanium dioxide Nanoparticles by Sol-Gel Method for Water Remediation Application*" International Conference on Emerging Application of Nanotechnology 2022, NIT Raipur, Sep 2022.
- Thirumalai Deepak, Anju R Babu "A study on hemocompatibility and in-vitro biodegradation properties of acellular caprine pericardium for tissue engineering applications" 9th World Congress of Biomechanics, Taiwan, July 2022.
- Anju R. Babu, Deepak Bajhaiya, Sagar, Konni Vidhya, Deepak T "Biomechanical Properties of Acellular Myocardial Scaffolds" 26th Congress of the European Society of Biomechanics, ESB-2021, Italy, July 2021.
- Deepak Bajhaiya, Anju R. Babu " Screening of Abdominal Aortic Aneurysms based on Machine Learning Approach" The Fourth Paradigm: From Data To Discovery Artificial Intelligence in Scientific Research, IISER Bhopal, January 2020.
- Anju R. Babu, M Lafith "Investigation of the Biomechanical Properties of Goat Skin" AP Biomech, Asian-Pacific Conference on Biomechanics, Taipei Taiwan -November 2019.
- Anju R. Babu, Deepak T "Optimization of Pericardium Decellularization Method for Tissue Engineering Applications" Asian-Pacific Conference on Biomechanics, Taipei, Taiwan, November 2019.
- Anju R. Babu, Katherine Kramer, Devin Laurence, Yi Wu., and Chung-Hao Lee "Layer-Specific Mechanical Responses and Morphological Structure of Atrioventricular Valve Leaflets" 8th World Congress of Biomechanics, Dublin, Ireland, July 2018.
- Anju R. Babu and Namrata Gundiah "Peel Studies on Diseased Thoracic Aortic Dissections" 8th World Congress of Biomechanics, Dublin, Ireland, July 2018.
- Samuel Jett, Devin Laurence, Katherine Kramer, Anju R. Babu, Yi Wu, and Chung-Hao "Biaxial Mechanical Testing and Constitutive Model Development of Atrioventricular Valve Leaflets" Engineering Mechanics Institute Conference, Boston, USA, June 2018.
- Katherine Kramer, Anju R. Babu, M.C. Hsu, A. Aggarwal, Yi Wu., and Chung-Hao Lee, "A Layer-Specific Constitutive Model for Atrioventricular Valve Leaflets" Engineering Mechanics Institute Conference, Boston, USA, June 2018.
- Chung-Hao Lee, Colton Ross, Devin Laurence, Lauren Evans, Jacob Richardson, Anju Babu, Ean Beyer, Yi Wu, Gerhard A. Holzapfel, Arshid Mir, Harold M. Burkhart "Role of Glycosaminoglycans in Biaxial Mechanical Behaviors of Porcine Atrioventricular Heart Valve Leaflets" SB3C2019 Summer Biomechanics, Bioengineering and Biotransport Conference, PA, USA, June 2019.
- Anju R. Babu, Tina U. Cohnert, Gerhard A. Holzapfel "Investigation of the Microstructural Organization and Mechanical Properties of Human Abdominal Aortic Aneurysms" Mechanobiology of Disease, NUS, Singapore, September 2016.

- Anju R. Babu, Namrata Gundiah “*Failure Mechanisms During Dissection of Human Ascending Aorta*” World Congress of Biomechanics, Boston, USA, July 2014.
- Anju R. Babu, Namrata Gundiah “*Exploring the Contributions of Variable Network Structure on Rubber Elasticity using Model Silicone Elastomers*” ICF: The World Academy of Structural Integrity, **EID: 2-s2.0-84898786191**, Beijing, China, June 2013.
- Anju R. Babu, Namrata Gundiah “*Physical Entanglements or Chemical Crosslinks Contributes for the Mechanical Properties of Crosslinked Polymer Network*” Indian Conference of Applied Mechanics, **ISBN 978-93-5137-273-8**, IIT Madras, July 2013
- Anju R. Babu, Tripti Mishra, Achu G. Byju, Ajay Kumar V, Binoy Chattuparambil, Namrata Gundiah “*Biomechanics of Ascending Aortic Dissection*” 19th Congress of European Society of Biomechanics, ESB2013, Patras, Greece, August 2013.
- Anju R. Babu, Mitesh L. Rathod, Sandhya Visweswariah, Namrata Gundiah “*Role of substrate stiffness and mechanical stimulus in endothelial phenotype*” International Conference on Angiogenesis: Basics and Applications, Anna University-KBC Research Centre, Chennai, March 2012.

RESEARCH GRANTS

Title	Sponsoring Agency	Duration
Metal oxide-elastomer hybrid nanocoated self-sterilizing mask	DST-NewGen IEDC (DMIMS (DU)/R&D/2021/398) funded by the National Science & Technology Entrepreneurship Development Board (NSTEDB), Department of Science and Technology, through Datta Meghe Institute of Higher Education and Research, Wardha, Maharashtra	2021-2022

PROFESSIONAL ACTIVITIES

Membership in Professional Society

- Society for Biomaterials and Artificial Organs: India, Thiruvananthapuram, Kerala, India
- American Association for Cancer Research
- European Society of Biomechanics

Conference Organized

- Conference convenor -Bioengineering-2020 (Virtual mode), 10-11th December 2020 (www.bioengineeringnitrbm.com).

Workshop Organized

- Computational Biomechanics for Medicine Workshop CBM XVIII (Virtual mode), part of Medical Image Computing and Computer Assisted Intervention Conference MICCAI Vancouver, 1st October 2023. (<https://cbm.mech.uwa.edu.au/CBM2023/index.html>)

Workshops Attended

- 7th Summer School on Biomechanics of Soft Tissues: Multiscale Modeling, Simulation and Applications, July 4-8th, 2016, Graz, Austria.
- BioTechMed-Graz, Future Space Biomedical Basics-Technological Developments-Medical Implementation, May 6th and 7th, 2015, Graz, Austria.
- Nanomechanics of cell-tissue-biomaterials, 19th Congress of European Society of Biomechanics, ESB2013, August 25, 2013, Patras, Greece.
- India nano 2012 Workshop on Electron and Ion beam Lithography for nanotechnology, December 3-4, 2012, Center for Nano Science, Indian Institute of Science, Bangalore, India.
- Advance School on ‘Living Mechanics: tissue and organisms’ October 28- November 8, 2010, National Centre for Biological Sciences, Bangalore, India.
- Workshop on Scaffold fabrication, International Conference on the Tissue Engineering and Regenerative Medicine, September 27, 2011, National Institute of Technology, Rourkela, India.

ADMINISTRATIVE RESPONSIBILITIES

- Member-Help Desk Central Seat Allocation Board, JoSAA, 2022, 2023
- Member- Institute Convocation Committee XIX -Publication (2022)
- Faculty Advisor for B.Tech Biomedical Engineering 2018 Batch
- Person in charge - Departmental PG project (Academic year 2018-2019)
- Person in charge- Departmental UG project (Academic year 2019-2020)
- Person in charge - Department Computational Facility (Academic year 2019-2020)
- Person in charge - Departmental Curriculum Development (Academic year 2020-2021)
- Person in charge- Departmental UG Biomedical Engineering Accreditation (Academic year 2019-2021)
- Person in charge - Departmental Furniture (Academic year 2018-2019, 2021-2022)
- Member- Departmental Training and Placement (Academic year 2023-2024, 2022-2023)
- Member- Departmental Accreditation Team(Academic year 2020-2021, 2021-2022, 2022-2023)