

## **George Zhuo Tan, Ph.D.**

Assistant Professor  
Department of Industrial Manufacturing & Systems Engineering  
Texas Tech University  
PO 43061, Lubbock, TX 79409-3061  
Phone: 1-(806)-834-3325  
Email: [george.z.tan@ttu.edu](mailto:george.z.tan@ttu.edu)  
Website: [https://www.depts.ttu.edu/imse/aml/TAN\\_Laboratory.php](https://www.depts.ttu.edu/imse/aml/TAN_Laboratory.php)

### **Education**

Ph.D.	07/2015	Industrial & Systems Engineering, North Carolina State University
M.IE.	12/2012	Industrial & Systems Engineering, North Carolina State University
B.S.	06/2009	Statistics, Communication University of China

### **Research Interests**

Hybrid Bioprinting, Electrospinning, Antimicrobial Nanomaterials, Photolithography

### **Professional Positions Held**

Sep 2016 - Present	Assistant Professor Texas Tech University (TTU), Lubbock, TX
Aug 2015 - Aug 2016	Senior Project Engineer Polyzen Inc., Apex, NC
Aug 2010 - July 2015	Research and Teaching Assistant North Carolina State University, Raleigh, NC
Jan 2009 - May 2010	Assistant Systems Engineer China Film Crest Digital Media Co. Ltd., Beijing, China

### **Refereed Publications**

#### **Journal Papers** (\*corresponding author)

1. Qavi, I., & **Tan, G.Z.\*** (2021). Near-field electrospinning polycaprolactone microfibers to mimic arteriole-capillary-venule structure. *Progress in Biomaterials*, 10(3), 223-233.
2. Zhou, Y., Qavi, I., & **Tan, G.Z.\*** (2021). Effects of Solution Viscosity on PLLA Porous Microtubes Fabricated by Core-Sheath Electrospinning. *Journal of Micro and Nano-Manufacturing*, 9(2), 021006.
3. Zhou, Y., Sooriyaarachchi, D., & **Tan, G.Z.\*** (2021). Fabrication of Nanopores Poly(lactic Acid) Microtubes by Core-Sheath Electrospinning for Capillary Vascularization. *Biomimetics*, 6(1), 15.
4. Zhou, Y., Sooriyaarachchi, D., Liu D., **Tan, G.Z.\*** (2021). Biomimetic Strategies for Fabricating Musculoskeletal Tissue Scaffolds: A Review. *The International Journal of*

Advanced Manufacturing Technology, 112, 1211–1229.

5. **Tan, G.Z.\***, & Zhou, Y. (2020). Electrospinning of biomimetic fibrous scaffolds for tissue engineering: a review. *International Journal of Polymeric Materials and Polymeric Biomaterials*, 69(15), 947-960.
6. Sooriyaarachchi, D., Maharubin, S., & **Tan, G.Z.\*** (2020). ZnO nanowire-anchored microfluidic device with herringbone structure fabricated by maskless photolithography. *Biomedical Engineering and Computational Biology*, 11, 1179597220941431.
7. Zaman, M.A.U., Sooriyaarachchi, D., Zhou, Y.G., **Tan, G.Z.\***, & Du, D.P.\* (2020). Modeling the density gradient of 3D nanofiber scaffolds fabricated by divergence electrospinning. *Advances in Manufacturing*, 1-16.
8. Zhou, Y., Sooriyaarachchi, D., Liu, D., & **Tan, G.Z.\*** Biomimetic strategies for fabricating musculoskeletal tissue scaffolds: a review. *The International Journal of Advanced Manufacturing Technology*, 1-19.
9. Maharubin, S., Hu, Y., Sooriyaarachchi, D., Cong, W.\*, & **Tan, G.Z.\*** (2019). Laser engineered net shaping of antimicrobial and biocompatible titanium-silver alloys. *Materials Science and Engineering: C*, 110059.
10. Maharubin, S., Nayak, C., Phatak, O., Kurhade, A., Singh, M., Zhou, Y., & **Tan, G.\*** (2019). Polyvinylchloride coated with silver nanoparticles and zinc oxide nanowires for antimicrobial applications. *Materials Letters*, 249, 108-111.
11. Peng, S., Yang, Y., Li, T., Smith, T. M., **Tan, G.**, & Zhang, H.C. (2019). Environmental benefits of engine remanufacture in China's circular economy development. *Environmental Science & Technology*, 53(19), 11294-11301.
12. Wang, M., Zhou, Y., & **Tan, G. Z.\*** (2019). Multivariate analysis of variance (MANOVA) on the microstructure gradient of biomimetic nanofiber scaffolds fabricated by cone electrospinning. *Journal of Manufacturing Processes*, 44, 55-61.
13. **Tan, G. Z.\***, & Zhou, Y. (2019). Electrospinning of biomimetic fibrous scaffolds for tissue engineering: a review. *International Journal of Polymeric Materials and Polymeric Biomaterials*, 1-14.
14. Peng, S., Li, T., Zhao, J., Guo, Y., Lv, S., **Tan, G. Z.**, & Zhang, H. (2019). Petri net-based scheduling strategy and energy modeling for the cylinder block remanufacturing under uncertainty. *Robotics and Computer-Integrated Manufacturing*, 58, 208-219.
15. Peng, S., Li, T., Zhao, J., Lv, S., **Tan, G. Z.**, Dong, M., & Zhang, H. (2019). Towards energy and material efficient laser cladding process: Modeling and optimization using a hybrid TS-GEP algorithm and the NSGA-II. *Journal of Cleaner Production*, 227, 58-69.
16. Sooriyaarachchi, D., Miniere, H.J., Maharubin, S., **Tan, G.Z.\*** (2019). Musculoskeletal Tissue Scaffold Incorporated with Aligned Nanofibers by Hybrid Additive Manufacturing. *Tissue Engineering and Regenerative Medicine*. 16(1), 29-38.
17. Peng, S., Li, T., Wang, Y., Liu, Z., **Tan, G.Z.**, & Zhang, H. C. (2019). Prospective life cycle assessment based on system dynamics approach: a case study on large-scale centrifugal compressor. *Journal of Manufacturing Science and Engineering*. 141(2), 021003.
18. Peng, S., Li, T., Li, M., Guo, Y., Shi, J., **Tan, G.Z.**, & Zhang, H. (2019). An integrated

decision model of restoring technologies selection for engine remanufacturing practice. *Journal of Cleaner Production*, 206, 598-610.

19. Maharubin, S., Zhou, Y., & **Tan, G.Z.\*** (2019). Integration of Silver Nanoparticles and Microcurrent for Water Filtration. *Separation and Purification Technology*, 212(9), 57-64.
20. Zhou, Y., Hu, Z., Du, D., & **Tan, G.Z.\*** (2019). The effects of collector geometry on the internal structure of the 3D nanofiber scaffold fabricated by divergent electrospinning. *The International Journal of Advanced Manufacturing Technology*, 100, 3045-3054.
21. Zhou, Y., Thakurathi, M., Quitevis, E., **Tan, G.Z.\*** (2018) Electrospinning 3D Nanofiber Structure of Polycaprolactone Incorporated with Silver Nanoparticles. *JOM*, 71(3), 956-962.
22. Nowlin, J., Bismi, M. A., Delpech, B., Dumas, P., Zhou, Y., & **Tan, G.Z.\*** (2018). Engineering the hard–soft tissue interface with random-to-aligned nanofiber scaffolds. *Nanobiomedicine*, 5, 1849543518803538.
23. **Tan, G.Z.\***, & Zhou, Y. (2018). Tunable 3D Nanofiber Architecture of Polycaprolactone by Divergence Electrospinning for Potential Tissue Engineering Applications. *Nano-Micro Letters*, 10(4), 73.
24. Maharubin, S., Zhou, Y., & **Tan, G.Z.\*** (2018). Development and investigation on a Silver Nanoparticle-Incorporated Electrofiltration System for Biofouling Control. *IEEE Transactions on Nanotechnology* 17(5), 948 - 954.
25. **Tan, G.Z.**, Orndorff, P. E., & Shirwaiker, R.A. (2018). The Ion Delivery Manner Influences the Antimicrobial Efficacy of Silver Oligodynamic Iontophoresis. *Journal of Medical and Biological Engineering*, 1-10.
26. Zhou, Y., Maharubin, S., Tran, P., Reid, T., & **Tan, G.Z.\*** (2018). Anti-biofilm AgNP-polyaniline-polysulfone composite membrane activated by low intensity direct/alternating current. *Environmental Science: Water Research & Technology*, 4(10), 1511-1521.
27. Zhou, Y., & **Tan, G.Z.\*** (2017). Fabrication of nanofiber mats with microstructure gradient by cone electrospinning. *Nanomaterials and Nanotechnology*, 7, 1847980417748478.
28. **Tan, Z.**, Havell, E.A., Orndorff, P.E., & Shirwaiker, R.A. (2017). Antibacterial efficacy and cytotoxicity of low intensity direct current activated silver–titanium implant system prototype. *BioMetals*, 30(1), 113-125.
29. Cavanaugh, D.L., **Tan, G.Z.**, Norris, J.P., Hardee, A., Weinhold, P.S., Dahners, L.E., Orndorff, P.E. and Shirwaiker, R.A., (2016). Evaluation of silver - titanium implants activated by low intensity direct current for orthopedic infection control: An in vitro and in vivo study. *Journal of Biomedical Materials Research Part B: Applied Biomaterials*. 104(5), 1023–1031.
30. **Tan, Z.**, Xu, G., Orndorff, P.E., & Shirwaiker, R.A. (2016). Effects of electrically activated silver– titanium implant system design parameters on time-kill curves against *Staphylococcus aureus*. *Journal of Medical and Biological Engineering*, 36(3), 325-333.
31. Narayanan, L.K., Kumar, A., **Tan, Z.**, Bernacki, S., Starly, B. & Shirwaiker, R.A. (2015). Alginate microspheroid encapsulation and delivery of MG-63 cells into polycaprolactone scaffolds: a new biofabrication approach for tissue engineering constructs. *Journal of Nanotechnology in Engineering and Medicine*. 6(2), 021003.

32. **Tan, Z.**, Orndorff, P.E. & Shirwaiker, R.A. (2015). Modified pharmacokinetic/ pharmacodynamic model for electrically activated silver-titanium implant system. *Biomaterials & Biomedical Engineering*, 2(3):127-141.
33. **Tan, Z.**, Ganapathy, A., Orndorff, P.E. & Shirwaiker, R.A. (2015). Effects of cathode design parameters on in vitro antimicrobial efficacy of electrically-activated silver-based iontophoretic system. *Journal of Materials Science: Materials in Medicine*, 26(1):1-10.
34. Samberg, M.E., **Tan, Z.**, Monteiro-Riviere, N.A., Orndorff, P.E. & Shirwaiker, R.A. (2012). Biocompatibility analysis of an electrically-activated silver-based antibacterial surface system for medical device applications. *Journal of Materials Science: Materials in Medicine*, 24(3), 755-760.

### Conference Papers

1. Zhang, N., Qavi, I., & **Tan, G.Z.\*** (2022) Teaming Engineering Students with Medical Students - Interdisciplinary Learning for Biomedical Innovation, 2022 ASEE Annual Conference and Exposition.
2. Qavi, I., Zhang, N., & **Tan, G.Z.\*** (2022) Fabrication of Dual-Material Microfiber Bundles by Co-Axial Near-Field Electrospinning, 2022 IISE Annual Conference and Expo.
3. Qavi, I., Sooriyaarachchi, D., Mathews, A. & **Tan, G.Z.\*** (2021) Rapid Fabrication of Branched Microfibers by Near-Field-Electrospinning, 2021 IISE Annual Conference and Expo Proceedings, 259-264.
4. Mann, M., **Tan, G.Z.\*** (2021) Recent Strategies for Improving Undergraduate Engineering Education: A Review. ASEE 2021 Gulf-Southwest Annual Conference.
5. Zhou, Y., Mahurubin, S., Sooriyaarachchi, D., & **Tan, G.Z.\*** (2020). Toward Fabrication of Capillary Blood Vessels, 2020 IISE Annual Conference and Expo, IISE 2020, 233-238.
6. Sooriyaarachchi, D., Zhou, Y., Maharubin, S., & **Tan, G.Z.\*** (2020). Microtube-Embedded Microfluidic Devices for Potential Applications in Blood Brain Barrier Research. *Procedia Manufacturing*, 48, 294-301.
7. Sooriyaarachchi, D., Wu, J., Feng, A., Islam, M., & **Tan, G. Z.\*** (2019). Hybrid Fabrication of Biomimetic Meniscus Scaffold by 3D Printing and Parallel Electrospinning. *Procedia Manufacturing*, 34, 528-534.
8. Zhou, Y., Mahurubin, S., Sooriyaarachchi, D., & **Tan, G.Z.\*** (2019). The Effect of Nanoclays on Nanofiber Density Gradient in 3D Scaffolds Fabricated By Divergence Electrospinning. *Procedia Manufacturing*, 34, 110-117.
9. Sooriyaarachchi, D., Maharubin, S., **Tan, G.Z.\*** (2019). ZnO nanowire anchored microfluidic device with herringbone structure fabricated by maskless photolithography. 2019 World Congress on Micro and Nano Manufacturing, Raleigh, NC.
10. Maharubin, S., Singh, M., Shu, X., Reyes, D.B., **Tan, G.Z.\*** (2019). Surface modification of titanium with covalently-bonded silver nanoparticles for antimicrobial applications, ASME 2019 14th International Manufacturing Science and Engineering Conference. Erie, PA.
11. Nowlin, J., Islam, M., Zhou, Y., **Tan, G.Z.\*** (2019). Cone electrospinning polycaprolactone/collagen scaffolds with microstructure gradient. ASME 2019 14th

International Manufacturing Science and Engineering Conference. Erie, PA.

12. **Tan, G.Z.\***, Zhou, Y. (2018). Fabrication of aligned nanofibers along Z-axis – A novel 3D Electrospinning technique, Proceedings of the 29th Annual International Solid Freeform Fabrication Symposium (pp. 2396)
13. Hu, Y., Maharubin, S., Cong, W., **Tan, G.Z.\*** (2018). Laser Engineered Net Shaping of Titanium-Silver Alloy for Orthopedic Implant. ASME 2018 13th International Manufacturing Science and Engineering Conference (pp. V001T05A016-V001T05A016). American Society of Mechanical Engineers.
14. Zhou, Y., **Tan, G.Z.\*** (2018). Generation of 3D Nanofiber Structure by Divergence Electrospinning for Tissue Engineering Scaffold. ASME 2018 13th International Manufacturing Science and Engineering Conference (pp. V001T01A001-V001T01A001). American Society of Mechanical Engineers.
15. **Tan, Z.**, Shirwaiker, R.A., Orndorff, P.E. (2013). Determining Optimal Current Intensity and Duration for Electrically Activated Silver-Based Prophylactic Hip Implant Prototype Design. ASME 2013 Summer Bioengineering Conference (pp. V01BT26A001-V01BT26A001). American Society of Mechanical Engineers.
16. **Tan, Z.** & Wysk, R.A. (2012). An Applicable Strategy for Scheduling Optimization in Multi-stage Flexible Manufacturing. IIE Annual Conference. Proceedings (p. 1). Institute of Industrial and Systems Engineers (IISE).
17. **Tan, Z.** & Shirwaiker, R.A. (2012). A Review of Emerging Industrial and Systems Engineering Trends and Future Directions in Biomanufacturing. IIE Annual Conference. Proceedings (p. 1). Institute of Industrial and Systems Engineers (IISE).

### **Book Chapter**

1. Sooriyaarachchi, D., Maharubin, S., & **Tan, G.Z.\*** Fabrication of Microtube-Embedded Chip to Mimic Capillary Vessels. In *The Blood Brain Barrier: Methods and Protocols*. Humana, New York, NY. Under Review.
2. **Tan, G.Z.\***, Zhou, Y., & Sooriyaarachchi, D. (2021). Musculoskeletal Tissue Engineering Using Fibrous Biomaterials. In *Wound Regeneration* (pp. 31-40). Humana, New York, NY.

### **Research Grants**

- “CAREER: Capillary-Incorporated Bioprinting of Biomimetic Soft Tissue Constructs”, National Science Foundation (CMMI-2145108), \$600,711, PI: **Tan, G.Z.** 06/2022-05/2027.
- “An Interdisciplinary Team-based Framework to Engage Undergraduate Students in Biomedical Innovation”, National Science Foundation (DUE-2013484), \$485,236, PI: **Tan, G.Z.**, Co-PIs: Biros, J., LeFevre, L., Xu, C., Dallas, T. 07/2020-06/2023.
- “Development of a minimally invasive strategy for transarticular fixation of spine fracture”, Texas Tech University (Presidents Strategic Growth Initiative Fellowship), \$157,812 PI: **Tan, G.Z.**, Co-PI: Nagy, L. 8/2018-7/2022.
- “Research and Education in Hybrid Manufacturing and Advanced Material

Remanufacturing”, Office of Naval Research (N00014-18-1-2287), \$174,000. PI: Zhang, H.C., Co-PIs: **Tan, G.Z.**, Xu, C., Du, D. 6/2018-6/2019.

### **Industry Projects**

- Invented an inflatable abdominal specimen retrieval apparatus. Polyzen Inc., 2016.
- Invented a plastic sealing method for pressure-controlled air vents. Polyzen Inc., 2016.
- Designed and built a database for process optimization on stoma appliance manufacturing. Polyzen Inc., 2015.
- Led and participated in over ten process development/optimization projects for plastic medical instruments, Polyzen Inc. 2015.

### **Ph.D. Dissertations Supervised**

#### **Chair**

- Nan Zhang, projected completing in 2025
- Trent Kelly, projected completing in 2025
- Imtiaz Qavi, projected completing in 2024
- Mohammed Ibrahim, projected completing in 2024
- Monikka Mann, projected completing in 2023
- Shahrma Maharubin, graduated in 2020
- Yingge Zhou, graduated in 2020
- Dilshan Sooriyaarachchi, graduated in 2020

#### **Committee member**

- Fuda Ning (Industrial Engineering), graduated in 2017.
- Hoyeol Kim (Industrial Engineering), graduated in 2018.
- Godlove Wanki (Mechanical Engineering), graduated in 2019.
- Srikumar Krishnamoorthy (Industrial Engineering), graduated in 2020.
- Amir Koneshloo (Industrial Engineering), graduated in 2020.
- Adib Zaman (Industrial Engineering)
- Ding Zhenya (Chemical Engineering)
- Dong Guo (Electrical and Computer Engineering)

### **Honors and Awards**

- The Faculty Early Career Development Award, National Science Foundation 2022
- President’s Excellence in Engaged Scholarship Award, Texas Tech University 2021

- First Place in Graduate Student Paper Competition, 2021 American Society for Engineering Education Gulf-Southwest Section. 2021
- Manufacturing & Design Track Best Student Paper Award, 2020 Institute of Industrial and Systems Engineers Annual Conference & Expo. 2020
- Coauthored poster (by R.A. Shirwaiker and G.Z. Tan) won the Best Young Investigator Poster Award, American Academy of Orthopaedic Surgeons- Orthopaedic Research Society (AAOS-ORS) Research Symposium, Chicago, IL. 2014
- Edward P. Fitts Fellowship, North Carolina State University. 2010 – 2011

## **Professional Services**

### **Professional Activities**

- Journal review: Critical Reviews in Biotechnology, Nanotechnology, Biofabrication, Biomacromolecules, Journal of Manufacturing Processes, Additive Manufacturing, Materials Science & Engineering C, Biomedical Materials, Materials Science in Semiconductor Processing, Materials Letters, ACS Applied Materials & Interfaces, Separation and Purification Technology, Membrane Water Treatment, Engineering in Life Sciences, Biomedical Physics & Engineering Express, Materials Research Express, Nano Future.
- Research proposal review for the Pre-Application of Peer Reviewed Medical Research Program under the Congressionally Directed Medical Research Programs (2018, 2019, 2020)
- NSF Panel Review: Manufacturing Machines and Equipment/CMMI (2017), Materials Engineering and Processing/CMMI (2018)
- Research proposal review for the Czech Health Research Council (2018)
- Advisory Committee Member of Industrial Technology Department in South Plains College, Levelland, TX (2018 - present)
- IISE Annual Conference & Expo, Session Chair, Biomedical Design and Manufacturing - II Modeling of Implants (2016); Micro/Nanoscale Manufacturing (2018)

### **University Services (Texas Tech University)**

- Faculty Advisor of the IISE Student Chapter at TTU (2021 – present)
- Faculty Advisor for Research Experiences for Undergraduates (REU) (2017 - present)
- Faculty Advisor for Inquiry and Investigation Pi Squared Program for Undergraduate Research (2018 - present)
- Faculty Advisor for outreach activities with Talkington High School on Senior Design (2019 - present)
- Competition Adjudicator/Juror for NSF Innovations in Graduate Education (IGE) Program competition (2017)

### **Department Services (Department of Industrial, Manufacturing & Systems Engineering (IMSE), Texas Tech University)**

- Chair of Undergraduate Student Affairs Committee, (2021-present)

- Member of Undergraduate Committee, (2018-2021)
- Undergraduate Advisor, (2017-present)
- Member of Safety Committee, (2017-present)
- Member of Department Website Committee, (2018-present)