

Department of Electrical and Computer Engineering



TEXAS TECH UNIVERSITY

Edward E. Whitacre Jr.

College of Engineering

Spring 2025 Seminar Series

Seminar Title: *Role of Nanotechnology, Additive Manufacturing and Flexible Electronics in Advancing Healthcare and Energy*

Time: 2:00-2:50 PM, Monday, Feb. 10, 2025

Location: ECE 101

Speaker:

Sachin Kadian

NC State University & University of North Carolina

Abstract:

The rapid innovations in nanotechnology, additive manufacturing, and flexible electronics are unlocking a new era of possibilities in both the healthcare and energy sectors by transforming the way we diagnose diseases, deliver treatments, generate and store energy more efficiently. For instance, nanotechnology plays a key role in developing novel drug delivery systems, medical diagnostics, regenerative medicine, energy conversion and storage by leveraging nanoscale materials with unique properties. Additive Manufacturing is revolutionizing healthcare by enabling the development of customized implants, lightweight and low-cost diagnostic tools, bio-printed tissues and organs, while also improving energy applications by facilitating lightweight solar panels, prototypes and customized energy devices. Flexible Electronics, with their lightweight, stretchability, bendability, flexibility and biocompatibility characteristics, are evolving wearable and implantable medical devices for real-time health monitoring, as well as flexible solar cells, smart sensors and energy-harvesting technologies. In this talk, I will present my research contributions focusing on the development of Sulfur doped Graphene Quantum Dots (S-GQDs) and their potential in both biomedical and optoelectronic applications. I will also showcase how we have applied additive manufacturing and flexible electronics to create innovative solutions such as ingestible capsules, point-of-care diagnostics, smart skin patches for on-demand drug delivery, lab-on-microneedle technology, and advanced wound care. Finally, I will outline my future research direction focused on developing next-generation technologies for a healthier and more sustainable world.

Speaker Bio:

Dr. Sachin Kadian is currently a Postdoctoral Research Scholar in the Joint Department of Biomedical Engineering at the University of North Carolina and North Carolina State University, NC, USA. Prior to this, he was a Postdoctoral Research Assistant at the School of Materials Engineering, Purdue University, USA. He earned his Ph.D. (Major in materials science, nanotechnology, and biomedical engineering) from the Indian Institute of Technology Roorkee, India in 2021. During his Ph.D., he was awarded with a very prestigious DST, SERB-Overseas Visiting Doctoral Fellowship (OVDF) supported by Govt. of India & University of Alberta (UofA) to pursue his research at the Department of Electrical & Computer Engineering, UofA, Canada. He received his M. Tech. in Biomedical Engineering from the National Institute of Technology (NIT), Kurukshetra in 2016 and B. Tech. in Electronics and Communication Engineering from the UIET, Kurukshetra, India in 2014. He has co-authored over ~60 publications in reputed SCI journals, international conferences as well as book chapters and patents. He has received more than 15 prestigious awards, recognitions, fellowships and travel grants such as BME Department Achievement Award at UNC & NCSU, DST SERB-OVDF Fellowship, Outstanding Research Article, Best Paper Award, Top-cited Article, Three-Minute Thesis (3-MT) Award, etc. His collaborative research work has also been highlighted in several news/magazines including Nature India, Atlas of Science, India Today, Times of India, Republic World, etc. His research interests include the synthesis and characterization of quantum dots (graphene, sulfur, carbon, and zinc oxide), nanomaterials, nanocomposites, additive manufacturing, flexible electronics and their applications in biosensors, photovoltaics, photocatalysis, drug delivery, bioimaging and antibacterial agents.



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