
Electrical & Computer Engineering
S E M I N A R
Louisiana State University

Silicon Carbide Electrochemical Sensor for Glucose Detection
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Abstract—This research work presents an electrospun-nanofibrous-membrane (ENFM) of silicon carbide nanoparticles (SiCNPs) with a conductive polymer (CP) for an electrochemical enzymatic glucose sensor. The surface area of a fiber matrix is a key physical property of a nanofiber membrane for enzyme binding. It is found that glucose sensing electrodes, having a SiCNPs-ENFM nanostructure, show enhanced binding of glucose oxidase (GOx) enzyme within the fibrous membrane. Morphological characterization of SiCNPs based ENFM was performed by using scanning electron microscopy (SEM) and using transmission electron microscopy (TEM) for SiC nanoparticles. The electrochemical analysis of SiCNPs-ENFM electrode was conducted by using cyclic voltammetry (CV), electrochemical impedance spectroscopy (EIS) and chronoamperometry (CA) methods. Glucose concentration was detected at +0.6 V in a 5 mM potassium ferricyanide electrolyte. SiCNPs-ENFM based glucose electrodes show a detection range from 0.5 mM to 20 mM concentration with the sensitivity of $30.75 \mu\text{A}/\text{mM cm}^2$ and the detection limit was $0.56 \mu\text{M}$. The lower change in current response for SiCNPs-ENFM based glucose sensing electrodes was observed for a 50 day period.

Bio—Dr. Kavyashree Puttananjegowda completed her Ph.D. in Electrical Engineering at University of South Florida with a prestigious “Signature Research Doctoral Fellowship”. She also received the “Best Presenter” award for her research work presentation at the IEEE Computing and Communication Workshop Conference 2022. Further, Dr. Puttananjegowda was awarded the University of South Florida Innovation Corps (USF I-Corps) grant and a prestigious National Science Foundation Innovation Corps (NSF I-Corps) grant awards as an entrepreneurial lead. Dr. Puttananjegowda founded AmpSense LLC., a start-up integrated circuit (IC) design company intended to provide custom integrated circuit design solutions for the healthcare industries. Dr. Puttananjegowda worked as a postdoctoral scholar at the University of California, Irvine in the Department of Electrical Engineering and Computer Science. Her research work was focused on wireless power transfer systems for implantable devices. As a senior design engineer at Qorvo Inc., Dr. Puttananjegowda currently working on radio frequency switches, low noise amplifiers, and power management integrated circuit designs in both silicon-on-insulator (SOI) and complementary metal-oxide-semiconductor (CMOS) process for mobile devices. Dr. Puttananjegowda possesses a wide-range of teaching experiences as a graduate teaching assistant at USF for the electronic materials, semiconductor devices, electrical circuit, nanostructures and nanomaterials courses. She also worked as an Assistant Professor at Visvesvaraya Technological University affiliated Engineering College to teach and conduct lab sessions for CMOS VLSI design, analog electronics, digital electronics, analog and digital communication courses. Dr. Puttananjegowda published her research work in 6 peer-reviewed journals, 11 IEEE conference proceedings, 3 book chapters and filed 5 patent disclosures.

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Where: Room 3285 Patrick F. Taylor Hall
Info: <https://www.lsu.edu/eng/ece/seminar>

