PMRF-ISSS Teaching Programme

Prime Minister Research Fellowship students' teaching requirement facilitated by the Institute of Smart Structures and Systems

Module PMRF-ISSS097/2024

Characterization Techniques for Investigation of Semiconductor Device Reliability

Name of the PMRF student

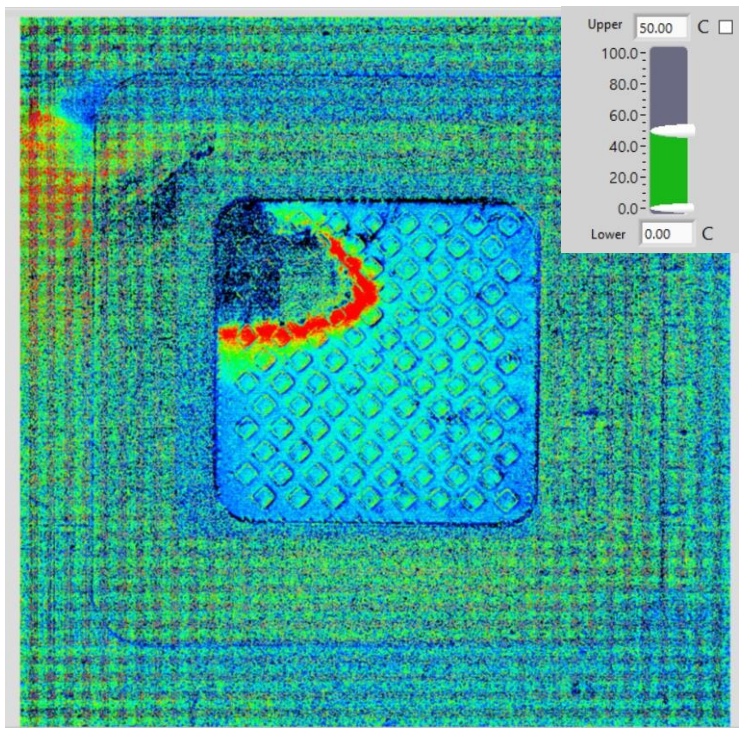
Harsh Raj

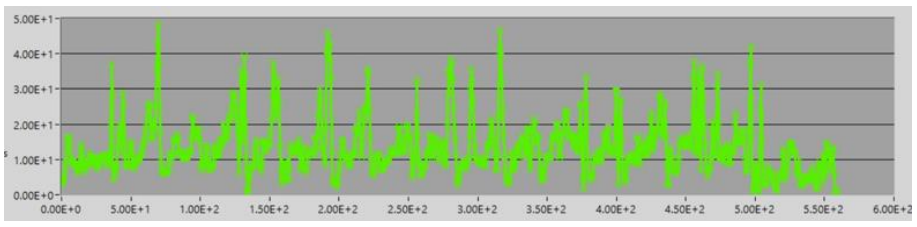
Required background of the students taught

Students currently pursuing PG degree in Electrical and Electronics Engineering whose thesis work is focused on semiconductor devices or related field. All interested are also welcome to join.

Online session coordinator

Will be chosen from the list of registrants





Details of the content of the module

The course will deal with different electrical, optical, and material characterization techniques used to study the reliability of semiconductor devices. Examples from contemporary research work will be discussed in each case.

1. Introduction to different aspects of semiconductor device reliability and techniques used for their characterization.
2. Piezo response Force Microscopy (PFM) and Raman Spectroscopy to measure the ferroelectric and piezoelectric properties of semiconductor devices.
3. Nano-scale Thermal Imaging, Scanning Thermal Microscopy (SThM) and Raman Thermometry to determine the self-heating during operation of semiconductor devices.
4. Electroluminescence (EL)/ Photoluminescence (PL) and Cathodoluminescence to determine the evolution of trap states during operation of semiconductor devices.
5. Electrical Characterisation Routine used to measure the time to failure (TTF) of devices
6. Transmission Line Pulse (TLP) to determine the ESD characteristics (Human Body Model, Human Metal Model, Machine Model, Charged Device Model)
7. Electron Microscopy Techniques (FIB-SEM and TEM) for post-mortem analysis of device failure mechanism

Schedule of the module

Start Date – July 20, 2024

Lecture Schedule – Recorded lectures will be uploaded every Saturday 5-7 PM; Few live discussion sessions will also be held; 25-27 interaction hours

End Date – October 19, 2024

Meeting link : Will be shared later

Link

Contact email ID: isss.forum@gmail.com

Registration link: https://forms.gle/sqsAyTmYxNLqaU2p8