National Institute of Technology Rourkela

Departmental Seminar

Seminar Title	: Introduction of Si-nanowire in Four-terminal (4T) Tandem Solar Cell to Improve Efficiency Share
Speaker	: Sakti Prasanna Muduli (521ee1013)
Supervisor	: Prof. Paresh Kale (Phone: 2447)
Venue	: New Seminar Room (EE 401)
Date and Time	: 20 Dec 2024 (5:30 PM)
Abstract	: The main challenge in commercializing multi junction tandem solar cells is the lack of economic viability, primarily due to the poor performance of the bottom cell caused by optical coupling. The study introduces a Si-nanowire (SiNW) array as the bottom cell of a GaAs//Si-nanowire tandem architecture to enhance the efficiency of the bottom cell in a four-terminal (4T) configuration. The work compares the bulk Si cell and SiNW for the bottom cell. Simulations of the SiNW bottom cell incorporate two key features from experimental data: increased surface area for improved photon absorption and increased surface recombination. Enhanced photon absorption in the SiNW array allows it to utilize the filtered spectra from the GaAs top cell, boosting the efficiency share and making the tandem architecture more cost-effective. The SiNW bottom cell shares 40.5% of the 4T tandem efficiency (30.85%), leading a path-way to introduce the SiNW array as the bottom cell to produce efficient Si-based tandem cells.