

GRANTEE EXPERIENCE REPORT

Indo-German Centre for Sustainability (IGCS)
IGCS Research Exchange, Grant Period 2024

experience report

Namitha D'Souza



IGCS Grantee

Namitha Dsouza

Home Institute

Department of Physics, Indian Institute of Technology Madras, Chennai

Home Supervisor

Prof. Jatin K Rath

Host Institute

Walter Schottky Institute, Technical University of Munich, Munich

Host Supervisor

Prof. Ian Sharp

Research Topic

Development of efficient carrier selective contacts with atomic layer deposition(ALD) for application in Si solar cells.

Focus Area

Si Photovoltaics

Starting/End date of the student exchange period

28/01/2024 – 28/07/2024



The poster features a smiling woman with long brown hair, wearing a yellow shirt and a backpack, standing in front of a red background with a white mandala pattern. The IGCS logo is in the top right corner. The text on the poster reads: "Grants For Students and Researchers", "Conduct Research on sustainability topics in India or Germany", "APPLICATION OPEN", "Floating deadline for the year 2024", and "For more information: <https://www.igcs-chennai.org/grants/>". At the bottom, there are logos for funding and association partners: DAAD, Ministry of Education and Research, Federal Ministry of Education and Research, RWTH Aachen University, C I A U, and TU9.

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Funded by

DAAD
Ministry of Education and Research
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As part of the IGCS scholarship grantees have agreed to provide an experience report to help IGCS evaluate their program. This experience report consists of two parts:

Part I: Written Testimonial

My motivation for applying for this program stemmed from a perspective of broadening my horizon and gaining insight into the comprehensive research happening globally in the field of Si photovoltaics. My aim in this project was to address the issues in the existing layers of Si solar cells and develop technology for growing the passivation and carrier selective contact layers of transition metal oxides. Fabrication of these layers with atomic layer deposition (ALD) holds a wide range of advantages with film uniformity over large area substrates and excellent step coverage on non-planar surfaces, control over angstrom level thickness and composition of the film, low substrate temperature, and the capability of depositing a wide variety of materials. Coupling the advantages of transition metal oxides and ALD, I was driven to develop high efficiency carrier selective contacts for Si solar cells.

I was anticipating being able to get hands-on experience with some of the sophisticated instrumental facilities that would aid in establishing an in-depth understanding of the science of solar cells.

At this point in my research career, this exchange provided a priceless chance for me to learn about and investigate new facets of carrier selective layers. I was thrilled to make use of the top-notch tools and resources provided, adding to the distinctive and excellent sustainability study.

The learnings and findings of the study are being analyzed, and I believe the outcome of this research will aid in the fabrication of Silicon solar cell devices using transition metal oxides at ease and give an insight into the carrier dynamics at the interface

The most memorable experiments that I performed were PDS (photothermal deflection spectroscopy) and XPS (Xray photoelectron spectroscopy). PDS is an optical measurement technique that gives valuable information about the subgap absorption and defects in materials, which aids in the comprehension of carrier transport mechanisms through the layers. XPS, though, is a common technique, but hands-on experience on this sophisticated setup was exciting.

Apart from the research experiences, I thoroughly enjoyed my stay in Munich, which was a beautiful city in itself. It provided me an opportunity to explore the Bavarian region of Germany and indulge in some cultural experiences native to Germany. The hiking experiences across some of the Bavarian Alps range were incredible. The food and beer culture was a distinctive experience for me as this was my first travel out of India. I was also fortunate enough to be the part of summer fest organised in the department which was very exciting and special.

The output and knowledge gained during this tenure will strengthen my research publication profile and puts the fabrication technique of the layers at ease for the devices. The findings of this work, especially the band analysis of titanium oxide and molybdenum oxide, will be of great use in fabricating a highly efficient Si solar cell device that would be stable and easier to

manufacture at a commercial scale. The investigation of the data acquired is underway and I believe that the results will be beneficial in comprehending the dynamics in materials grown by ALD.

I would voice to the future grantees that this grant provides an opportunity for you to explore the research happening globally, especially at some world-class institutions. This provides a route for a researcher to gain practical experience in sophisticated facilities and it puts you on the pedestal on many occasions during your exchange, which adds invaluable advancement in your personal and academic paths. This opportunity is also a chance for you to live independently overseas and gain experiences of day-to-day life that are very different from your home country. In addition to studies, it allows you to travel and fully immerse yourself in a different social and cultural environment, which undoubtedly broadens your perspective of the world.

Part II: Digital Media

Share your experience in digital media- maybe photographs, illustration, or graphics. Share them in the space below.



