

## IGCS Research Exchange, Grant Period 2023

# Shivam Kumar Dwivedi



### Experience Report on IGCS Research Exchange, Grant Period 2023

#### IGCS Grantee

Shivam Kumar Dwivedi

#### Home Institute | Home Supervisor

Indian Institute of Technology, Madras, Chennai, India | Prof. Ravi Kumar N

#### Host Institute | Host Supervisor

Institute for Energy and Climate Research (IEK), Forschungszentrum Juelich, RWTH Aachen University,  
Guided by: Prof. Olivier Guilon

Supervised by: Dr. Mariyam E. Ivanova

#### Research Topic

Investigation of the microstructure and electrochemical performance of PCEC steam electrodes as a function of their composition and manufacturing conditions

#### Starting/End date of the student exchange period

01.04.2023 – 30.06.2023



A promotional poster for IGCS grants. It 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 text on the poster reads: 'IGCS INDU-GERMAN Centre for SUSTAINABILITY', '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 partners: DAAD, Ministry of Education and Research, Federal Ministry of Education and Research, RWTH Aachen University, CAU, and TU9.

#### About the IGCS Grants

IGCS awards scholarships to students and researchers from India and Germany with excellent academic records, very good English, and intercultural communication skills. The scholarship consists of a mobility grant and an accommodation grant according to DAAD funding rates, as a rule. Learn more about the funding opportunities at IGCS [here](https://www.igcs-chennai.org/grants/).

## Experience Report on IGCS Research Exchange, Funding Period 2023

*As a beneficiary of the IGCS scholarship, the participant has committed to sharing their valuable experience. This report is designed to encompass two distinct parts:*

### **Part I: Written Testimonial**

Hello, I am Shivam Dwivedi, an M.S. (by research) scholar from the Metallurgical and Materials Engineering Department, IIT Madras, Chennai, India. Only I am responsible for the content of the experience report.

First, I want to thank and acknowledge the support I get from many people. Naming a few of them who directly connected with this research exchange, my Indian advisor Prof Ravi Kumar; host advisor Prof. Olivier Guillon and host supervisor, Dr. Mariya Ivanova; IGCS coordinators Prof. Krishna Vasudevan and Lisa van Aalst; and the whole selection committee.

I am from the central part of India, and in the final year of my M.S. This M.S. is a unique program on its own, unlike M.S. in Germany or M.Tech in India. It is a research-oriented program that prepares an early-stage researcher mindset. My M.S. thesis is based on Proton conducting solid oxide electrolysis cells. You may have heard of a fuel cell, which converts chemical energy into electrical energy, so these electrolyzers work the opposite of it. These cells operate at a higher temperature which is thermodynamically more favourable. These cells operate at a higher temperature which is thermodynamically more favourable because we don't need costly material. The idea of this technology is to store the excess amount of energy generated from renewable sources in the form of chemical energy and use it again whenever required. For more information, please refer to my technical report.

This was my second visit to RWTH Aachen University, Germany. Previously, I was under the IIT Madras-RWTH Aachen Junior research fellowship for six months. My host advisor has a chair at the Institute of Mineral Engineering RWTH, Aachen University, and he is also the Director of the Institute of Energy and Climate Research (IEK) Materials Synthesis and Processing (IEK-1), Forschungszentrum, Juelich so my workplace was IEK-1 Forschungszentrum Juelich. I used to travel from Aachen to Juelich (30 KM) daily by Bus. Initially, my defined work was computational, but we needed to change our plan because of some circumstances, which delayed my work for two months. In September 2022, I presented this work in a lab group, so some research gaps needed to be filled to take this work as my M.S. thesis.

From there, I sought funding to host me for three months in Germany. First time I heard about IGCS from some of my friends who attended Summer School in 2022, and I helped them during their initial days. Fortunately, when I wrote to Prof. Vasudevan, he replied very positively, and then I wrote a proposal for this stay and got the scholarship.

Now, let me tell you something about Germany. Let's start with the aerial view of Frankfurt airport; Air is very clean. We can easily see details from the sky, then ICE train (Intercity-Express), and it's the first time I experienced 350 KM/hr speed: immaculate transport vehicles, houses, disciplined people, roads, and even people's clothes. It's like people are wearing new clothes every day. It's always better if we

know someone there, so I got a buddy from RWTH, so it was easy for me to settle down. The transportation system is very robust and punctual. It might not be accessible during the initial days, but once we are acquainted, it becomes super easy; we can trace every Bus and train. We don't need to ask anyone for anything.

Now let's come to discuss the preparation to go to Germany. There are many aspects of it; however, now we have a WhatsApp group of IGCS coordinators and students, so it's convenient to discuss your problems with them, and a lot of information is available on their website. You are reading this, which means you have got the scholarship, congratulations! The first and foremost thing is VISA, so you need to work on that.

Next, you need a travel plan; check YouTube vlogs, and remember after reaching Frankfurt, you need to book ICE tickets to Aachen as early as possible because this price is dynamic: <https://www.bahn.com/en>

Students used to say that getting admission to RWTH is still easy, but getting affordable accommodation is tough, so you should start looking for accommodation as early as possible. At the same time, you should be careful of potential fraud. You can visit the RWTH international website to get a housing guide. You can also check here: <https://www.wg-gesucht.de/>

Similarly, there is AISA (Association of Indian Students in Aachen) in Germany, and they have what's app and Facebook groups where they used to put a lot of accommodation and sublet options. They also conduct many events in which we can participate to connect with people. I have experienced and volunteered for many occasions, such as the RWTH Graduate ceremony, Welcome Week 2022, etc.

Another aspect is traveling (whether you like it or not), you should feel the beauty of the European Union here. The transit from one country to another is so smooth. Traveling with Studifahren and pm2Amtrips are good options where you do not need to prepare and plan, and they are very much affordable also. I have travelled to many countries, Spain and Italy are special because we stayed there for 3-4 days. The other trip was on weekends, so we only got a little time.

Another aspect is that work-life balance is appreciable here in Germany, and I have interacted with many people. This interaction taught me that core feeling, or emotion is the same irrespective of gender, caste, religion, culture, and country, for example, mother's love and affection.

Also, you should be emotionally strong to live in Germany. This is a downside here that you might feel lonely. You can join some sports or extracurricular activities where you can interact and make new friends.

All the best



## Part II: Digital Media

Grantees are invited to share their experiences in digital media, encompassing photographs, illustrations, or graphics within the context of the IGCS scholarship.



Glimpse of interaction with professional colleagues



Glimpse of traveling to multiple places with friends