IPID4all Doctorate Research Exchange at University of Oldenburg
Feedback report

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Home supervisor: Prof. Dr. V. Jayathirtha Rao
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Exchange period: 04 Jan 2017 – 30 Mar 2017
Exchange topic: Synthesis, Analytical and Forensic Aspects of Novel Organic Molecules

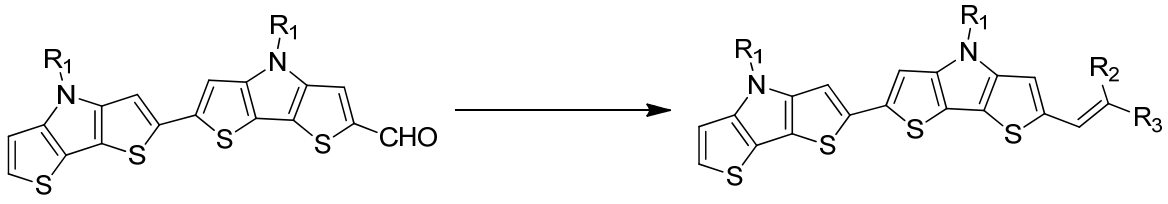
Introduction

At the University of Oldenburg there is a strong expertise in investigations on optical properties of nano materials for renewable energy applications; for this purpose, we wanted to immobilize the newly synthesized dye sensitized solar cell (DSSC) molecules at our laboratory (*CSIR-IICT, Hyderabad, India*) on titania and study their optical properties. Currently, DSSCs are the most promising third generation solar technology available. The efficiency of DSSC lies in the underlying properties of the molecule employed within it. Thus, the results obtained via the proposed study, will be helpful in better designing highly efficient and cost effective DSSC molecules which can be further used in high efficiency solar cell devices. The molecules to be investigated contain donor and acceptor elements as well as anchor groups for optimum electron transfer to the underlying oxide.

Research Undertaken

The research work was focused on newly synthesized organic dye molecules represented in (**Fig.1**). In total, five new dye molecules were synthesised based on scaffold 1 and scaffold 2. The tailormade dye molecules were able to immobilize on titania nanoparticles because of the presence of anchoring groups R2 and R3 (*structure not revealed*). The dye coated titania nanoparticles were later characterized using fluorescence spectroscopy, fluorescence microscopy, infrared spectroscopy, UV-Vis spectroscopy and X-ray photo electron spectroscopy to understand the optical behaviour of the dye molecules. The results obtained are to be supported with literature and synthesis data and it is expected to be published in peer reviewed journal.

Scaffold 1



Scaffold 2

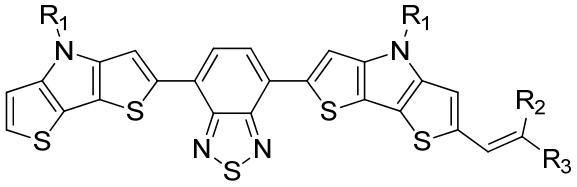


Fig.1: Newly synthesized dyes for DSSC

Also, having learnt about the instrumental methods available in Oldenburg, apart from carrying out the aforesaid work, I was able to develop a systematic research approach to investigate the time dependent changes of fingerprints using fluorescence microscopy, atomic force microscopy and X-ray photo electron spectroscopy. The methods provided exceptional details that are to be accomplished further for a possible publication in high impact journal.

Personal Experience

The exchange visit to University of Oldenburg was very helpful and informative. I had the opportunity to discuss and carry out my research work with the experienced scientific staff from different groups. Prof. Al-Shamery and her team has allowed me to master and use the instrumentation facility available at their laboratory. She was always supportive and encouraged healthy discussions that allowed us to define attainable results. The working culture at her laboratory is very much comfortable and friendly that helped me integrate among them easily. Besides, I appreciate the welcoming nature of fellow researchers who were very much helpful, open minded and positive. I was considered equally to be the part of weekly seminar, group meetings and small celebrations which made me feel united. Further, I had the moment to experience the German culture from the close which was completely new and very interesting. I believe the visit was of paramount importance to understand the general idea of research and capabilities and I look forward for future collaborations.

Conclusions

The exchange visit for three months at University of Oldenburg was a positive and informative experience from the scientific as well as personal perspective. Overall, I believe IPID4all presented a great opportunity to connect to a number of experienced researchers and I assume it is one of the best programs to increase the international collaborations.

Outlook

As discussed in “research undertaken” still the work is in progress and two publications are expected from this exchange visit.

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