

MHRD Scheme on Global Initiative on Academic Network (GIAN)

Title

Novel Platform on Organocatalysis – Since & Then

1.0 Overview

Continuously increasing interest towards the concept of “GO GREEN” has motivated chemist to develop alternative reagents to metals. Therefore, to achieve this challenge a number of approaches have been addressed. Those methods are rely on atom economical approach such as direct C-C and C-X bond formation using organocatalysis and non-metal catalyzed / mediated synthetic transformations. These methods avoid the risk for the formation of hazardous byproducts in compare to the traditional metal catalyzed/mediated synthetic approaches. These continual developments in this research field have stimulated steps up opportunities in newer dimensions of organocatalysis that can be turned as the sustainable workplace of tomorrow. The field of organocatalysis has gained considerable attention towards the synthesis of drug molecules for life threatening diseases. Hence, the topic of organocatalysis in terms of theory and experimental should be learned in great details. In this regards, this course will focus on the application of organocatalyst on a number of methods such as domino reactions, multicomponent reactions and direct functionalization of C-C, and C-X bond formation. Additionally this course will also focus on the application of organocatalysis on recent hot topics of research such as C-H activation, Cooperative dual catalysis and frustrated Lewis pairs.

This course has been structured to present a detailed overview of the organocatalysis. The complete course consist several lectures, tutorials and assignments. The participant will gain valuable concept in a broad range of topics on the synthetic transformations using organocatalysis.

2.0 Objectives

The course intends to fulfill following objective:

- To create exposé for participants with the fundamentals of organocatalysis
- Exposing participants to the novel areas of organocatalysis and application in broad spectrum of research fields
- To provoke the capability and interest of the participants from north-eastern region of India to align them with recent trends of research.

3.0 Teaching Faculty with allotment of Lectures and Tutorials

- (1) Prof. Dr. René Wilhelm, Department of Chemistry, University of Paderborn, Germany
 - **6 hrs lecture and 3 hrs tutorial**
- (2) Dr. Chandi Charan Malakar, Department of Chemistry, National Institute of Technology, Manipur
 - **4 hrs lecture and 3 hrs tutorial**

4.0 Course details

The key lectures will be delivered by Prof. Dr. René Wilhelm, department of chemistry, University of Paderborn, Germany who is one of the experts in the field of organocatalysis. The course coordinator and foreign expert will coordinate the tutorials and assignments each day in the afternoon. We plan to have a number of lectures, tutorials and assignments within the time frame mentioned above. The tentative title of the course would be: "Novel Platform on Organocatalysis – Since & Then". The course will remain open to the participants for the interaction and discussions with external faculty during the course period. Every day there will be two-hour lecture on the topics outlined above. This will be followed by tutorial, discussions and assignments that will be restricted on the concepts delivered in the lectures. The course coordinator, together with other faculties, will conduct the tutorials and assignments.

4.1 Tentative Duration:

If proposal is accepted the above mentioned course is proposed to be held at the seminar hall, NIT Manipur, Langol campus during 22 - 26 September 2020 (5 days) : 10 hrs lectures, 3 hrs tutorials and 2 hrs assignments.

4.2 Proposed Lecture Schedule

Day 01: September 22, 2020 (Tuesday)

Lecture 01	10:00 am -11:00 am
	<i>Title: Introduction to the organocatalysis (by Prof. Dr. René Wilhelm)</i>
Lecture Overview	The lecture will focus on the basic concept of organocatalysis.
Lecture 02	11:00 am - 12:00 noon
	<i>Title: Application of organocatalysis in C-C and C-X bond formation (by Dr. Chandi Charan Malakar)</i>
Lecture Overview	During the lecture the application of organocatalysis in C-C and C-X bond formation will be discussed.
Lecture 03	2:00 pm - 3:00 pm
	<i>Title: Organocatalysis in domino and multicomponent reaction (by Prof. Dr. René Wilhelm)</i>
Lecture Overview	This lecture will highlight the application of organocatalysis in domino and multicomponent reaction in the synthesis of bioactive molecules.

Day 02: September 23, 2020 (Wednesday)

Lecture 04	10:00 am -11:00 am
	<i>Title: Organocascades and organocatalyzed Cycloadditions (by Prof. Dr. René Wilhelm)</i>
Lecture Overview	The mentioned course will offer the overview of the potential application of organocatalysis in cycloaddition.

- Tutorial 01** **11:00 am - 12:00 noon**
The tutorial session will focus on the discussion and problem solving
(by Dr. Chandi Charan Malakar)
- Lecture 05** **2:00 pm - 3:00 pm**
Title: Organocatalysis in the synthesis of natural products
(by Prof. Dr. René Wilhelm)
- Lecture Overview The above mentioned lecture will highlight a broad overview on the
application of organocatalysis on the total synthesis of natural products
and drug molecules.
- Tutorial 02** **3:00 pm - 4:00 pm**
The tutorial session will focus on the discussion and problem solving
The tutorial session will focus on the discussion and problem solving
(by Dr. Chandi Charan Malakar)

Day 03: September 24, 2020 (Thursday)

- Lecture 06** **10:00 am - 11:00 am**
*Title: Recent advances in Brønsted acid catalysis (by Prof. Dr. René
Wilhelm)*
- Lecture Overview This lecture will represent the novel approaches of Brønsted acid
catalysis in organic synthesis.
- Tutorial 03** **11:00 am - 12:00 noon**
The tutorial session will focus on the discussion and problem solving
(by Prof. Dr. René Wilhelm)
- Lecture 07** **2:00 pm - 3:00 pm**
Title: Organocatalyzed Epoxidation reactions
(by Dr. Chandi Charan Malakar)
- Lecture Overview This lecture will provide an overview of the epoxidation reaction using
organocatalyst
- Assignments 01** **3:00 pm - 4:00 pm** (by Dr. Chandi Charan Malakar)

Day 04: September 25, 2020 (Friday)

- Lecture 08** **10:00 am -11:00 am**
*Title: Cooperative catalysis and Ion pairing in organocatalysis (by Prof.
Dr. René Wilhelm)*
- Lecture Overview This lecture will provide an overview of organocatalysis on

cooperative dual catalysis and ion pairing

Tutorial 04**11:00 am - 12:00 noon**

The tutorial session will focus on the discussion and problem solving
(by Prof. Dr. René Wilhelm)

Lecture 09**2:00 pm - 3:00 pm**

*Title: Organocatalyzed asymmetric acyl transfer reaction
(by Dr. Chandi Charan Malakar)*

Lecture overview

This lecture will discuss regarding recent development on the application of organocatalysis in symmetric acyl transfer reaction.

Tutorial 05**3:00 pm - 4:00 pm**

The tutorial session will focus on the discussion and problem solving
(by Dr. Chandi Charan Malakar)

Day 05: September 26, 2020 (Saturday)**Lecture 10****10:00 am - 11:00 am**

Title: Hydroaminations and asymmetry induced by covalent interactions in organocatalysis (by Dr. Chandi Charan Malakar)

Lecture Overview

The entire lecture will focus on the recent challenges and future scope of the organocatalysis on *hydroaminations and asymmetry induced by covalent interactions*.

Tutorial 06**11:00 am - 12:00 noon**

The tutorial session will focus on the discussion and problem solving
(by Prof. Dr. René Wilhelm)

Assignment 02**2:00 pm - 3:00 pm (by Dr. Chandi Charan Malakar)****Date of Examination:** September 26, 2020 (Saturday) (3:00 pm - 4:00 pm)**5.0 Who can attend?**

Undergraduate, Post-graduate, Ph.D Students, Postdoctoral fellow or Research Associate and faculty from both Science and Engineering streams as well as from Industry and Research Organization.

6.0 Detailed CV of Experts

6.1 CV of Prof. Dr. René Wilhelm (Department of Chemistry, University of Paderborn, Germany)

He was born in November 1972 in Hanover, Germany. After his A-levels and his military service, he started in 1993 his chemistry studies at the University of Hanover. He completed in 1998 his studies with his diploma



work in the group of Prof. Butenschön. He then moved to London and got in 2001 his Doctor of Philosophy at the Imperial College of Science, Technology & Medicine in London, in the group of Dr. Widdowson. Thereafter, he was for one year Postdoc with Prof. Vollhardt in Berkeley, California. After an additional half year as Postdoc with Prof. Magnus in Austin, Texas, he started in 2003 his independent academic career as a junior-professor at the Clausthal University of Technology in Germany. After a positive mid-term evaluation of his junior-professorship in 2006, he did in 2009 additionally a habilitation at the Technical University of Clausthal. He was associate professor at the Nicolaus Copernicus

University of Toruń in the summer semester 2010. He is a member of the Royal Society of Chemistry, the American Chemical Society and the German Chemical Society (GDCh). Between 2001 und 2002 he was a Feodor-Lynen Fellow of the Alexander von Humboldt Foundation. He was awarded in 2010 a Heisenberg Fellowship of the German Research Foundation and received in 2016 and awarded a Thieme Chemistry Journals Award. His research interest relies on mainly organocatalysis and ionic liquids. He has number of publications in international journals. Please follow the link of his research webpage @ <https://chemie.uni-paderborn.de/arbeitskreise/organische-chemie/wilhelm/>

6.2 CV of Dr. Chandi Charan Malakar, Assistant Professor Department of Chemistry, National Institute of Technology (NIT) Manipur



Dr. Chandi Charan Malakar currently an Assistant Professor at the department of chemistry, National Institute of Technology (NIT) Manipur. After Completing M.Sc from IIT Kanpur and working as a research fellow at Ludwig-Maximilians University Munich (LMU Munich), Germany, Dr. Malakar awarded his doctorate degree in 2011 from University of Hohenheim, Stuttgart, Germany with Prof. Uwe Beifuss. Followed by three successive Postdoctoral Research stay (during 2011-2014) at University of Antwerp, Belgium and University of Heidelberg, Germany, in 2014 Dr. Malakar has joined a

Canadian Pharmaceutical Company called SignalChem LifeSciences Pvt. Ltd. as Senior Principal Scientist. Afterwards, in 2015 he worked as research associate at Indian Institute of Science (IISc) Bangalore and as Assistant Professor (on contract) at NIT Jalandhar. He has awarded several fellowships such as MCM scholarship for M.Sc study, Pegasus Marie Curie postdoctoral fellowship, PBC postdoctoral fellowship and BOF - IWO postdoctoral fellowship etc. Apart from a number of abstract high-lights in scientific magazine, chemical catalogues and conference papers, he has published more than 50 research articles in high impact factor international peer-reviewed journals. His current research targets on developing novel methodologies on transition-metal catalysis, C-H activation, organocatalysis, frustrated Lewis Pairs, cooperative dual catalysis, *asymmetric catalysis*, chemistry of heterocycles and green chemistry.

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7.0 Course Registration

Fees Structure for attending the course is as follows:

Participants from abroad: US \$200

Participants from Industry/ Research Organizations: Rs. 5000/-

Participants from Academic Institutions:

UG Students: Rs. 1000/-

PG Students: Rs. 1500/-

Ph.D Students: Rs. 2000/-

Postdoctoral fellow/Research Associate: Rs. 2500/-

Faculty Members: Rs. 3000/-

If available, the participants will be provided with accommodation in hostel.

8.0 Proposed Budget

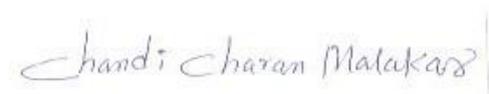
Sl. No	Description of Budgetary Head for the Course	Amount (Rs.)
1	International Expert Air Fare	1,50,000.00
2	Honorarium to Expert (\$300x6 + \$250x3 = \$2550) x 67 [\$1.00 = Rs. 67/-]	1,70,850.00
3	Lecture Notes/video-learning material preparation	80,000.00
4	Video recording expenses	50,000.00
5	Contingency & Miscellaneous	80,000.00
Grand Total:		5,30,850.00

9.0 Coordinators

Course Coordinator: Dr. Chandi Charan Malakar, Department of Chemistry, NIT Manipur

Local Coordinator: Dr. Th. David Singh, Department of Chemistry, NIT Manipur

Course Coordinator



Signature

Dr. Chandi Charan Malakar

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