



# 32MYM

32<sup>ND</sup> MID YEAR MEETING OF THE  
INDIAN ACADEMY OF SCIENCES

VIRTUAL / CISCO WEBEX EVENT

4, 11, 18 & 25 JUNE | 16:00–18:30 h

2 JULY | 14:00–19.30 h

## EVENT SCHEDULE

### CHEMISTRY/ ENGINEERING

Inaugural Lectures  
by Fellows/Associates

18  
JUNE 2021  
(FRIDAY)

- 16:00–16:20 **Porous Framework Materials: What are they good for?**  
**Rahul Banerjee**  
*IISER, Kolkata*
- 16:25–16:45 **Coherent Processes and other Emerging Trends in Molecular Semiconductors**  
**Satish A Patil**  
*IISc, Bengaluru*
- 16:50–17:10 **A facile Chemical Approach to Design Functional & Durable Nature-Inspired Wettability**  
**Uttam Manna**  
*IIT, Guwahati*
- 17:15–17:35 **Engineering to Science & Science to Engineering A Journey Over The Last 25 Years**  
**Debatosh Guha**  
*University of Calcutta, Kolkata*
- 17:40–18:00 **Extreme Classification: A New Paradigm for Search and Recommendation**  
**Manik Varma**  
*Microsoft Research India, Bengaluru*
- 18:05–18:25 **Moving towards a Memory-centric World**  
**Manan Suri**  
*IIT, Delhi*

Link for Webex attendees: [bit.ly/MYM2021\\_Day3](https://bit.ly/MYM2021_Day3)

YouTube Live Stream: [youtu.be/ZYVTpLCW7UU](https://youtu.be/ZYVTpLCW7UU)

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**18**  
**JUNE**  
**2021**  
**16:00 – 18:30 h** | **CHEMISTRY  
AND  
ENGINEERING**

*Abstract eBook*

# 32mym

Inaugural  
Lectures  
by Fellows/  
Associates



**RAHUL BANERJEE**

*IISER, Kolkata*

**FELLOW**

**2020**

*Chemistry*

18 June 2021  
16:00 - 16:20 h



## **Porous Framework Materials: What are They Good For?**

The speaker and his research team have successfully overcome the chemical stability problem of Covalent organic frameworks (COFs) by synthesizing  $\beta$ -ketoenamine based frameworks, while processability, synthetic hurdles, and scalability of COFs still remain unexplored. In order to address these key issues, they have developed a very simple, scalable and novel methodology by which COFs can be synthesized by simple mixing and heating of the reactants. Using this method, COF can be processed in to self-standing covalent organic framework membranes (COMs). The resultant COMs display higher porosity and crystallinity over their reported powder form. These self-standing COMs are flexible, continuous, devoid of any internal defects or cracks, show long-term durability. They have utilized these COMs for separation applications such as waste water treatment and recovery of valuable active pharmaceutical ingredients [APIs] from organic solvents.

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Inaugural  
Lectures  
by Fellows/  
Associates



**SATISH A PATIL**

*IISc, Bengaluru*

**FELLOW**

**2021**

*Chemistry*

**18 June 2021  
16:25 - 16:45 h**



## **Coherent Processes and Other Emerging Trends in Molecular Semiconductors**

A rapid improvement in performance of organic solar cells, light-emitting diodes and field-effect transistors largely originate from the successful development of new molecular semiconductors. However, the fundamental question still remains related to the unequal mobility of hole and electron in  $\pi$ -conjugated polymers. A rational design of polymers is necessary to target n-type stable polymers, which can work in ambient processing conditions. Our laboratory employs a molecular engineering approach to develop high charge carrier n-type polymers for enhancing the performance of optoelectronic devices. In this talk, the speaker will present the integrated approach to materials design for coherent transport in molecular semiconductors. Specific emphasis will be placed on the molecular design principle to rationally develop the molecular semiconductors for singlet fission, high performance organic solar cells with coherent transport.

# 32mym

Inaugural  
Lectures  
by Fellows/  
Associates



**UTTAM MANNA**

*IIT, Guwahati*

**ASSOCIATE**

**2018**

*Chemistry*

18 June 2021  
16:50 -17:10 h



## **A Facile Chemical Approach to Design Functional & Durable Nature-Inspired Wettability**

Applications of nature-inspired wettabilities include oil/water separation, anti-corrosion, underwater robotics, protein crystallization, drug delivery, open microfluidics, water harvesting etc. Generally, essential chemistry and appropriate topography that conferred the special liquid wettability were mostly achieved by associating delicate chemistry, where hydrophilic hierarchical top was decorated with inert chemicals. Eventually, the synthesized materials suffered from poor durability issue. To develop durable and functional bio-inspired wettability, recently, the speaker and group have extended 1,4 conjugate addition reaction between amine and acrylates at ambient condition. Further, porous and chemically reactive interfaces were prepared for tailoring various important and functional liquid wettability. The synthesized interfaces were successfully applied to demonstrate some practically relevant outdoor applications.

# 32mym

Inaugural  
Lectures  
by Fellows/  
Associates



**DEBATOSH GUHA**

*University of Calcutta,  
Kolkata*

**FELLOW**

**2021**

***Engineering***

**18 June 2021  
17:15 -17:35 h**



## **Engineering to Science & Science to Engineering A JOURNEY OVER THE LAST 25 YEARS**

The speaker will describe his scientific ventures of the past 25 years, from the summer of 1996 when he was attending a conference at France, his interaction with Prof. Tatsuo Itoh and his introduction to antenna research. Active antenna was booming in the early 1990s and the available literature was primarily focusing on their applications or engineering developments. He will speak of an integrated antenna in L-band that he designed for a Canadian Government Laboratory. Subsequently, several lucrative proposals also poured in from the industries. He will describe how printed and dielectric resonator antennas operating over a wide range of frequencies and to be deployed on various working platforms were the primary challenges. Finding out their solutions led the speaker and group sometimes from Engineering to Science and vice versa. The journey that embodies several moments of success and failure will be addressed in this presentation.

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Inaugural  
Lectures  
by Fellows/  
Associates



**MANIK VARMA**

*Microsoft Research India,  
Bengaluru*

**FELLOW**

**2021**

*Engineering*

18 June 2021  
17:40 - 18:00 h



## **Extreme Classification: A New Paradigm for Search and Recommendation**

In this talk, the speaker will give a high level overview of extreme classification, which is a new research area in machine learning dealing with classification problems involving an extremely large number of categories. He will also discuss how extreme classification has opened a new paradigm for key industrial applications in web search and recommendation.

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Associates



**MANAN SURI**

*IIT, Delhi*

**ASSOCIATE**

**2020**

*Engineering*

18 June 2021  
18:05 - 18:25 h



## Moving towards a Memory-centric World

We live in an era which is more memory-centric than ever. Factors that contribute to the ever increasing importance of memory are – (i) Saturation of Moore's law, (ii) ease of generating enormous amounts of data and (iii) exciting new material properties. A fundamental shift in the vastly successful Von Neumann computational paradigm is needed to overcome the bottlenecks associated with data-intensive applications. This is where next generation Non Volatile Memory (NVM) begins to play a significant role. In his research at IIT-D, they have been actively working on exploiting the characteristics of emerging NVM nanodevices and nanomaterials for a multitude of novel applications. They have explored several emerging nanoelectronic technologies and developed an entire memory-centric application ecosystem comprising of hybrid CMOS-NVM circuits. In this talk, the speaker will present a brief overview of his on-going R&D efforts related to NVM and its applications spanning across technology and use cases.