

ICGEB-DBT Workshop

**Synthetic Biology of photosynthetic organisms
to produce value added products**

SynBio22

June 17- 24, 2022



International Centre for Genetic
Engineering and Biotechnology,
New Delhi

Meeting Overview and Description

Synthetic biology extends the genetic engineering toolbox by adopting programming concepts such as standardization and modularity, by designing pathways and products that may not exist in nature, and rewriting biosynthetic pathways. Research in algae and plants engineering approaches has advanced rapidly since the advent of molecular biology. It has huge potential to contribute to the global bio-economy by biosynthesizing economically viable pharmaceutical and bioenergy molecules.

This ICGEB workshop will bring together leaders from the synthetic biology area to translate their expert knowledge to the next generation. The program will highlight how innovative synthetic biology approaches can be used for biosynthesis of bioenergy and pharmaceutical molecules using the photosynthetic organisms. The meeting will promote the cutting-edge tools of synthetic biology for bioenergy. It will open the platform for discussion for synthetic biology-enabled engineering from industry perspectives. The unique opportunity will be provided to graduate students, post-docs, and relevant scientists to present and exchange new data and ideas and to catalyse the interaction between junior and senior researchers. Short talks will be selected from local teaching staff. The meeting's collegial atmosphere, deep discussion sessions, and informal gatherings may provide a distinctive forum for cross-disciplinary networking and forge relationships for conducting and accomplishing collaborative future research.

The focus of this meeting would be on the basic understanding and learning of synthetic biology tools with specialization for exploring the biosynthetic pathways to produce bioenergy and pharmaceutical molecules in photosynthetic organisms. Seminar sessions will cover topics in the organization, genome editing, RNAi, regulation and modulation of biosynthetic pathways, metabolite transport and storage, and emerging technologies in the plant related to value added products and mitigating the excess amount of CO₂ in atmosphere by rewiring the carbon concentration mechanism (CCM) in photosynthetic organisms. The workshop will be for eight days featuring approximately 12 specialized talks related to Hands on Training with expectation of 30 participants; 15 from ICGEB member states and 15 from India of academia and Industries research background.

The major session and topic of each session will be in the tentative format as following.

DAY 1: Friday 17 June 2022

Theme: **Synthetic biology of photosynthetic organisms**

1:30 PM – 2:20 PM	Registration
2:20 PM – 2:30 PM	Inaugural welcome by ICGEB Director: Dr. Dinakar M. Salunke
2:30 PM – 3:30 PM	Inaugural keynote speaker: Prof. Henry Daniell , University of Pennsylvania, USA. <i>Topic: Chloroplast Biotechnology and Translation Research</i>
3:30 PM – 4:30 PM	Tea & Networking
4:30 PM – 5:30 PM	Speaker: Prof. Thomas Mock , School of Environmental Sciences, The University of East Anglia, Norwich, England <i>Topic: Applied synthetic biology for marine algae</i>
5:30 PM – 6:30 PM	Dr. Anindya Bandyopadhyay, Reliance Industries Ltd., India <i>Topic: CRISPR applications for industrial biotech, highlighting Algae</i>
7:00 PM – 9:00 PM	Gala Dinner & Networking

DAY 2: Saturday 18 June 2022

Theme: Cell culture and Hands on training

9:30 AM – 10:30 AM	Dr. Senthil Chinnasamy , Chief Technology Officer, Aban Infrastructure Limited, Chennai, India <i>Topic: Algae culture for commercial applications</i>
10:30 AM – 11:00 AM	Tea & Networking
11:00 AM – 5:00 PM	<i>Hands on training:</i> To prepare media for photosynthetic organisms cell culture, growth measurement, culture conditions: illumination, temperature and pH for optimum growth, antibiotic sensitive assays prior to genome editing etc. <i>Coordinator: Dr. Ashok Kumar Ganesan & Ms Wafaa Zohir</i>

DAY 3: Sunday 19 June: Holiday

DAY 4: Monday 20 June 2022

Theme: Omics-Bioinformatics tools and Hands on training

9:30 AM – 10:30 AM	Dr. Pavan Jutur , ICGEB, New Delhi <i>Topic: Multifaceted applications of microalgal biomass valorization to enriched biorenewables employing Omics Perspectives</i>
10:30 AM – 11:00 AM	Tea & Networking
11:00 AM – 5:00 PM	<i>Hands on training:</i> In-silico-vectors construction, in-silico gene mining etc. <i>Coordinator: Dr Prachi Nawkarkar & Mr Vikas U. Kapase</i>

DAY 5: Tuesday 21 June 2022

Theme: **Genome editing by CRISPR/Cas9 and Hands on training**

9:30 AM – 10:30 AM	Dr. Prachi Nawkarkar and Ms. Tulika Sinha, ICGEB, New Delhi <i>Topic: Tools and techniques for genome editing using CRISPR-Cas9</i>
11:30 AM to 11:00 AM	Tea break & Networking
11:00 AM – 5:00 PM	<i>Hands on training:</i> Genetic modification of photosynthetic organisms using gene-gun (static)/ handheld gene gun, Electroporation. Case study of genome editing in marine alga <i>Parachlorella kessleri</i> -I using CRISPR/Cas9. <i>Coordinator: Ms. Promita Deb & Ms. Shagoofa Ali</i>

DAY 6: Wednesday 22 June 2022

Theme: **Gene silencing by RNAi and Hands on training**

9:30 AM – 10:30 AM	Dr Neeti Saran Mishra, ICGEB, New Delhi <i>Topic: To knock out gene in plants using RNAi approach</i>
11:30 AM to 11:00 AM	Tea break & Networking
11:00 AM – 5:00 PM	<i>Hands on training:</i> RNAi approach in photosynthetic organisms as case study of <i>Chlorella</i> sp., RNA extraction, qRT-PCR etc. <i>Coordinator: Dr. Prachi Nawkarkar & Shagoofa Ali</i>

DAY 7: Thursday 23 June 2022

Theme: **Scale-up of algae and Hands on training**

9:30 AM - 10:30 AM	Dr. Sourish Bhattacharya, CSIR-CSMCRI, Bhavnagar-364002, Gujarat, India. <i>Topic: Scale-up of algae for value added products</i>
11:30 AM to 11:00 AM	Tea break & Networking
11:00 AM – 5:00 PM	<i>Hands on training:</i> Lipid and biomass productivity in microalgae, and outdoor cultivation <i>Coordinator: Dr. Santhosh Kumar Kookal & Mr Vikas U. Kapse</i>

DAY 8: Friday 24 June 2022

Theme: **Analytical tools for value added products and Hands on training**

9:30 AM-10:30 AM	Dr. Ashutosh Pandey, NIPGR, New Delhi <i>Topic:</i> phytochemistry to study the nutritional traits in photosynthetic organisms
11:30 AM to 11:00 AM	Tea break & Networking
11:00 AM – 5:00 PM	<i>Hands on training:</i> Lipids and FAME study using GC-MS, Pigments analysis by TLC <i>Coordinator: Mr Vikas U. Kapase, Ms Wafaa Zohir & Mr Girish H.R.</i>