



# MHRD-Global Initiative of Academic Network



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## Applied Photosynthesis: Putting Nature to Work

Department of Plant Sciences, School of Life Sciences University of Hyderabad, Hyderabad 500 046, INDIA

September 16<sup>th</sup> -20<sup>th</sup>, 2019

### Overview

The course is proposed to teach a five-day intensive and interactive class on the fundamentals, design, characterization/testing and future challenges in BioHybrid Solar energy capture and conversion. This will introduce the fundamentals of how nature harnesses solar energy. It will provide an introduction to various issues including solar radiation, basic photochemistry, and photobiology. It will be taught at a level that graduate students in Molecular Biology, Biochemistry, chemical and bioengineering, and material science.

### Objectives

The primary objectives of the course are as follows:

- Exposing participants to the fundamentals of natural and artificial photosynthesis
- Expose them to the emerging developments in Applied Photosynthesis
- Introduce the challenges and practical problems of building biohybrid devices
- Expose them to the recent international leaders and innovators in this area and some of their most recent accomplishments.

### Course Details

- Fundamentals of photosynthetic energy harvesting
- Photosynthetic Hydrogen production
- BioHybrid Solar Cell

### How to apply:

Interested candidates must login GIAN-MHRD website <http://www.gian.iitkgp.ac.in/> to fill application. Please submit your detailed resume. For more details contact: [appliedphotogian@gmail.com](mailto:appliedphotogian@gmail.com) (or) visit: <http://www/slsuoh.org/appliedphotogian>

### Who can attend

- Advanced Under graduates with approval of Instructors
- Graduate Student students at all levels (MSc/MTech/PhD) in appropriate disciplines
- Engineers and researchers from manufacturing, service and government organizations including R&D laboratories
- Faculty from reputed academic institutions and technical institutions.

### Registration Fees

Participants from abroad	US \$ 500
P.G. Students	Rs. 1000/-
Postdocs/Ph. D scholars	Rs. 2000/-
Faculty/Scientist	Rs. 4000/-
Industry	Rs.10,000/-

For mode of payment please visit: <http://www/slsuoh.org/appliedphotogian>. The above fee includes all instructional materials, lunches, computer use for tutorials, 24 hr free internet facility. The participants will be provided with Guest house accommodation on payment basis.

### Teaching Faculty



**Prof. Barry D. Bruce lab:** Cellular & Molecular Biology & Microbiology Departments, University of Tennessee at Knoxville, USA works concurrently on two aspects of membrane biochemistry related to photosynthesis: Chloroplast protein import and Applied photosynthesis.

**Chloroplast protein import:** Prof. Barry have a long-standing interest in on the biogenesis of organelles and in particular the family of organelles specific to plants, known as plastids. This family includes a divers set of organelles that perform an extensive set of biochemical reactions including the process of photosynthesis, which takes place in chloroplasts. This diverse metabolic activity is the enabled via the import of several thousand nuclear encoded proteins from the cytosol. This targeting and import process is critical to many if not most of the key metabolic processes associated with plants. We are specifically interested in how chloroplast destined precursors are targeted, recognized and translocated into the plastid via two translocons, TIC and TOC, that are found in the chloroplast inner and outer envelope membranes, respectively. This process is mediated by selective recognition of the transit peptide by one or more of the TOC components. We are working to explain the biochemistry and biophysics of how these proteins are translocated across the plastid membranes.

**Applied photosynthesis:** A second area of research is how we may exploit the ultra efficient process of solar energy capture and conversion of natural photosynthesis into hybrid devices that will provide either direct photovoltaic electricity or be stored in some form of fuel such as molecular hydrogen. To date we have help design build and characterize novel: 1) luminescent solar concentrators, 2) hybrid Bio-organic thin-film photovoltaic devices, 3) hydride bio-inorganic photovoltaic devices, and 4) bio-Pt hydrogen evolving nanoparticles.



**Prof. Rajagopal Subramanyam:** University Hyderabad, made significant contributions to the area of photosynthesis related to the structure, bioenergetics and acclimation of chloroplasts. His group studied in detail the structural and organizational dynamics of photosystems (PS) and their light harvesting complexes (LHC) in *Chlamydomonas reinhardtii* as well as Arabidopsis thaliana under moderate stress. His group worked on the LHCII phosphorylation triggering in fluctuating light, the LHCB2 subunit undergoes dissociation of the entire LHCII from PSII and eventual migration to PSI which is called state transitions (balancing energy transfer between PSII and PSI). Under temperature stress too induced state transitions constituted an important protective strategy. His group studied the influence of high light and iron deficiency on the organization of photosynthetic apparatus and proposed a structural model of PSI from *C. reinhardtii*. Further, he showed *C.reinhardtii* cells acclimated through non-photochemical quenching dependent involvement of LHC stress related proteins in high light, Fe deficiency and drought stresses. In addition, his lab has used proteomics and metabolomics-based approaches to dissect the abiotic stress responsive signaling events in chloroplasts of higher plants, and algal systems

### Coordinator

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Please send your resume to: [appliedphotogian@gmail.com](mailto:appliedphotogian@gmail.com) on or before August 26<sup>th</sup>, 2019