

## Under the aegis of GIAN

### **CO-PRODUCT RECOVERY FROM EXISTING AND FUTURE BIO-REFINERIES (SECOND GENERATION BIOREFINERY FOR PRODUCING LIGNOCELLULOSIC BIOFUELS )**

**17<sup>th</sup> to 21<sup>st</sup> December, 2018**



**Sponsored by: MHRD, Govt. of India**

#### **Organized By**

Department of Civil Engineering  
National Institute of Technology Karnataka  
Surathkal, Mangalore-575025,  
Karnataka, INDIA  
[www.nitk.ac.in](http://www.nitk.ac.in)

#### **Overview**

A biorefinery is a facility similar to petroleum refinery that integrates biomass conversion processes and equipment to produce fuels, electricity, heat, value-added products (like animal feed, substrate for making chemicals and materials) from biomass. Biomass is a sustainable, renewable resources that could come from agricultural operation, forest by-products and municipal solid waste. Various components in biomass could be processed to produce multiple products in a biorefinery to maximizing the value derived from the biomass feedstock. When compared to fossil fuel based economy, bio-based economy offer several benefits to the society, which include creating local jobs, increasing fuel security, and good for the environment with zero greenhouse gas emissions. Several western countries like US, Brazil have established first generation biorefinery that produce ethanol from starch (from corn grains) and sucrose (from sugar cane). Though this is good for the environment that has helped to replace 10% of petroleum fuel with ethanol, this is not ethical and sustainable as food is being used for producing fuels, while several people in world are dying every day without food. Keeping these ethical issues in mind, western government agencies are investing in second-generation biorefinery technology to produce fuels from lignocellulosic biomass. This will help to displace about 30% of petroleum fuel in the near future. Several pilot scale operation are being carried out to demonstrate second-generation biorefinery technologies in US. It is believed that establishing biorefinery will serve as a key for economy development in the next few decades. One key factor to promote bio-based technology is to educate young researchers, entrepreneurs and policy makers with co-product recovery from existing and future bio-refineries. This will positively contribute to improve the efficiency of existing biorefinery and help to establish second-generation biorefineries in India.

This course focuses on educating the participants about existing biorefineries and second generation biorefining processes that produces fuels, chemicals and value added products by (i) providing basic understanding of technical aspects with respect to biomass processing; (ii) Designing methods and modeling of biorefinery processing systems for the usage of all components from biomass; (iii) give theoretical background about calculating mass, energy balances in a biorefinery process.

## Course Information:

- Duration: 17<sup>th</sup> – 21<sup>st</sup> December , 2018
- Total Contact Hours: 15 hours
- **Number of participants for the course will be limited to fifty**

## Modules:

- *Introduction to Biorefinery concept, conversion of biomass to useful products from biorefineries*
- *Fundamentals on lignocellulosic biomass structure, composition and properties.*
- *Mass and energy balance for different biorefinery steps*
- *Different scenarios of producing a range of products and co-products in 2<sup>nd</sup> generation biorefinery*
- *How to design a 2<sup>nd</sup> generation biorefinery?*
- *Different options of recovery of energy and resources to make value added co-products in a 2<sup>nd</sup> generation biorefinery.*
- *Introduction to LCA and techno-economic analysis for a 2<sup>nd</sup> generation biorefinery*
- *Evaluation of Biorefinery benefits: sustainability, economic criteria, social impact and environmental benefits*

## You Should Attend if you are...

- Executives, engineers and researchers from manufacturing, service and government organizations including R&D laboratories, policy makers and industry people who are interested in developing biobased technologies.
- Student students at all levels (BTech/MSc/MTech/PhD).
- Faculty from reputed academic and technical institutions who are engaged in teaching and research related to Biotechnology, Bioprocess engineering, Biomass conversion composite materials and mechanics fields.

## Course-Fees (Non-refundable):

### **The participation fees for taking the course is as follows:**

- Participants from abroad: US\$250
- Industry/ Research Organizations: INR 5000
- Academic Institutions: INR 3000 for faculty, INR 1000 for Research Scholars/Students

### **Note:**

The above fee includes all instructional materials, computer use for tutorials and assignments. **(Exclusive of GIAN Portal Registration fee)**

The Registration fee has to be paid via Demand Draft in favour of **“Director, NITK Surathkal”** payable at Surathkal.

Accommodation based on availability and prior request shall be provided as per the prevailing NITK rates.

Please note that no TA/DA shall be paid to participants.

# The Faculty



## VENKATESH BALAN

**Venkatesh Balan**, Ph.D. is currently with Engineering Technology Department, Biotechnology Program, Huston University and Adjunct Associate Professor

at Chemical Engineering & Materials Science, Michigan State University, Lansing, MI, USA. His research experience include, protein expression system in microbes, understanding structure and function of protein, producing fuels and chemical from lignocellulosic biomass using chemical pretreatment, enzyme hydrolysis and microbial fermentation, identification of small molecules using spectroscopy techniques. He spent almost twelve and half years at Michigan State University and developed key technologies including: several novel ammonia pretreatment process to produce pretreated agricultural residues useful for producing bio-fuels, bio-chemicals and animal feed, cost effective microbial fermentation process and healthy nutritional products from fungus. Dr. Balan is internationally recognized for his work in the area of understanding synergy operating between enzymes during biomass hydrolysis, developed fast hydrolysis and fermentation process by efficiently recycling enzymes, microbes, lignin separation and fractionation to produce precursors for biomaterials and finally separation and structure determination of oligosaccharides. Some of his inventions has helped to reduce the cost of producing second-generation biofuels and produce healthy food materials by different processing engineering approaches.

<b>Citations 7731</b>		<b>RG Score</b> <b>42.49</b>
<b>h-index</b> <b>46</b>	<b>i10-index</b> <b>104</b>	

### PATENTS

Issued patents: 6; Filed Patents: 5

### RESEARCH PROJECTS:

Completed: 25 (\$8.95 million)

Ongoing: 3 (\$0.52 million)

## International Faculty

**Prof. VENKATESH BALAN, Ph.D.,**  
*Engineering Technology Department,  
Biotechnology Program,  
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## Course Coordinator(s)

### Dr. ARUN KUMAR THALLA

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# Course Registration Process

## Step 1: One Time Registration

Registration for GIAN courses is not free because of constraint in the maximum number of participants allowed to register for a course. In order to register for any course under GIAN, candidate will have to get registered one time first to GIAN Portal of IIT Kharagpur using the following steps: 1. Create login and password at <http://www.gian.iitkgp.ac.in/GREGN/index> 2. Login and complete the Registration Form. 3. Select Courses 4. Confirm your application and payment information. 5. Pay Rs. 500/- (non-refundable) through online payment gateway. 6. Download and print “pdf file” of your enrolment application form for your personal records and copy of the same to be sent to the Course Coordinator.

## Step 2: Institute Registration

1. Institute registration process is an offline process. Interested candidates are requested to download the Registration Form (docx/pdf).

## Course Fee (Non-refundable):

The participation fee to attend the short course shall be:

Participants from Abroad -	US \$ 250
Professionals from Industry/Research Organizations -	INR 5000
Faculty from Academic Institutions -	INR 3000
Research Scholars/Students -	INR 1000

The above fee includes the instructional materials, internet facility and snacks between the sessions. The accommodation will be provided on payment basis subject to availability on request otherwise participants will have to make their own stay arrangement.

The Registration fee has to be paid via Demand Draft in favour of ***“Director, NITK Surathkal”*** payable at Surathkal.

Scan copy of the filled in “Registration Form” along with scan copy of “Demand Draft” and Application Form generated in Step 1 must be sent via E-mail to the Course Coordinator of the programme [arunkumar@nitk.edu.in](mailto:arunkumar@nitk.edu.in); [revacp@gmail.com](mailto:revacp@gmail.com).

Selection will be made purely on First Come First Serve Basis and Eligibility (Subject to fulfilling of the seats available).

Maximum fifty (50) participants will be accommodated in the course.

The Brochure and the Registration Form may be downloaded from the Institute website [www.nitk.ac.in](http://www.nitk.ac.in).

# National Institute of Technology Karnataka, Surathkal



Government of India  
Ministry of Human Resource  
Development



## CO-PRODUCT RECOVERY FROM EXISTING AND FUTURE BIO-REFINERIES (SECOND GENERATION BIOREFINERY FOR PRODUCING LIGNOCELLULOSIC BIOFUELS) (17<sup>th</sup> to 21<sup>st</sup> December, 2018)

### Registration Form

1) Name: \_\_\_\_\_

2) Designation & Department \_\_\_\_\_

3) Organization: \_\_\_\_\_

4) Mailing Address: \_\_\_\_\_

5) Phone No.: \_\_\_\_\_

6) E-mail: \_\_\_\_\_

7) GIAN Application ID: \_\_\_\_\_

8) Course Fee/Category of Registration:

- Academic Institutions Students (Rs. 1000)
- Academic Institutions Faculty (Rs. 3000)
- Industry / Research Organizations (Rs. 5000)
- Participants from abroad (US \$ 250)

I am enclosing a DD No. \_\_\_\_\_ dated \_\_\_\_\_ drawn on \_\_\_\_\_ amounting to Rs \_\_\_\_\_/-only.

9) Accommodation Required: Yes/No

Date:

Signature

### RECOMMENDATION OF THE SPONSORING AUTHORITY

The application of Dr./Mr./Mrs./Ms ..... working as..... at  
..... is sponsored to attend the course on "**CO-PRODUCT RECOVERY  
FROM EXISTING AND FUTURE BIO-REFINERIES (Second generation biorefinery for producing lignocellulosic  
biofuels)**" being organized by Department of Civil Engineering, NITK Surathkal

Place & Date:

Signature of the Supervisor/ Head of the Deptt./ Institute with seal

Place:

Send through post to Dr. Arun Kumar Thalla, Dept. of Civil Engineering, NITK Surathkal, Mangalore 575025, Karnataka, INDIA

Please visit [www.gian.iitkgp.ac.in](http://www.gian.iitkgp.ac.in) and [www.nitk.ac.in](http://www.nitk.ac.in) for more details