COURSE OVERVIEW

Production of potable water and cooling are emerging as two major research fields necessary for sustenance of humankind. This is especially relevant for a developing nation like India with its huge population and tropical climate. For example, the potential cooling demand in metropolitan Mumbai is about 25% of the total cooling demand for the entire United States. Meeting such a huge demand for cooling entirely by high grade electrical energy will further stress the energy situation of the country. From energy conservation, environmental protection and sustainability perspectives, innovative thermally driven thermodynamic cycles are needed to produce cooling effect and/or potable water at a low specific energy input. Thermally powered adsorption cycle employs low temperature waste-heat sources that are available in abundance from industrial processes, exhaust of engines, micro-turbines etc. can effectively produce cooling energy and/or potable water. In this course, participants will become acquainted with the roots and the prospective paths branching out of a figurative tree that the field of adsorption science and technology represents.

This course is organized in two modules that should be taken together. The topics in Module A will be based on the energy policy and utilization trend, introduction to various energy conversion systems and fundamental aspects of adsorption science where the topics such as general aspects and history of adsorption cooling science and technology, basic concepts, measurement and data analysis techniques relevant to adsorption isotherms, kinetics and isosteric heat of adsorption will be covered. Module B will deal with the application aspects of adsorption systems, introduction to basic and advanced low grade thermal energy driven adsorption cooling and/or desalination systems, why this technology should be considered as the sustainable technology, its advantages and drawbacks. Course participants will learn the above mentioned topics through lectures and interaction. Some practical exercises related videos will supplement the lectures. This will inspire the attendees of the course to professionally pursue the incredible path of adsorption science for sustainable cooling and desalination applications.

COURSE CONTENT

Module A: Energy perspective and fundamental aspects of thermally powered adsorption science

- ✓ Energy utilization trend and economic forecast.
- ✓ Introduction to various energy conversion systems.
- ✓ Adsorption fundamentals: Introduction to adsorption isotherms, review and discussion on a related technical paper.
- ✓ Introduction to adsorption kinetics and isosteric heat of adsorption, review and discussion of a related technical paper.
- ✓ Pressure-temperature-concentration (P-T-X) diagrams, group discussion on the usefulness of P-T-X diagram using various adsorbent-refrigerant pairs.

Module B: Application aspects of adsorption science for cooling and desalination

- ✓ Ideal adsorption cooling cycle and performance modeling of adsorption cooling systems.
- ✓ Application aspects: Selection and classification of adsorbent materials, adsorber design, evaporator and condenser design.
- ✓ Design and development of basic and advanced adsorption cooling cycles.
- ✓ Design and development of adsorption desalination, cooling-cum-desalination, group discussion on future scope and application of adsorption science.
- ✓ Tips for writing a technical paper and review of few related technical papers by course attendees.

Tutorial:

- ✓ Design of experimental setups for characterization of thermodynamic and thermophysical properties

OBJECTIVE

- ❖ To provide an understanding of the underlying physical principles of adsorption and the necessity of thermally powered energy conversion systems from the energy conservation and environmental protection perspectives.
- ❖ To provide the basis for design and performance calculation (modeling) of adsorption devices.
- ❖ To communicate the great variety of application possibilities of adsorption devices for cooling and desalination applications. This application-oriented aspect shall be supported by practical design examples.

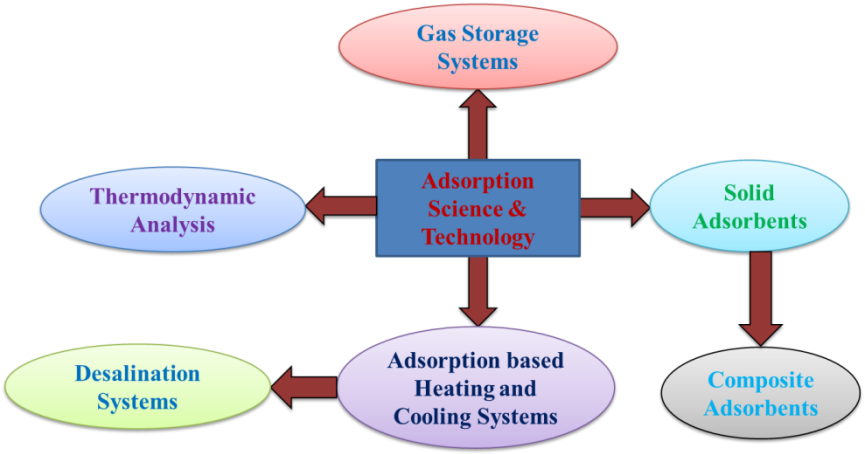
Global Initiative of Academic Networks

Two Weeks Course

on

Adsorption Science and Technology for Cooling and Desalination Applications

11th – 21st September, 2017



॥ ज्ञानम् सर्वजनहिताय ॥

सत्यमेव जयते

Ministry of Human Resource Development, Government of India

Discipline of Mechanical Engineering

Indian Institute of Technology Indore

Khandwa Road, Simrol, Indore, M.P. - 453552, India

Website: www.iiti.ac.in/GIAN

TEACHING FACULTY

Prof. Bidyut Baran Saha obtained his B.Sc. (Hons.) and M.Sc. degrees from Dhaka University of Bangladesh in 1987 and 1990, respectively. He received his Ph.D. in 1997 from the Tokyo University of Agriculture and Technology, Japan and joined as an Assistant Professor. He worked as an Associate Professor at the Interdisciplinary Graduate School of Engineering Sciences of Kyushu University until 2008. He worked as a Senior Research Fellow at the Mechanical Engineering Department of National University of Singapore prior to joining the Mechanical Engineering Department of Kyushu University in 2010 as a full professor. He joined the Kyushu University Program for Leading Graduate School, Green Asia Education Center in March 2013 as a professor. Since January 2016, he has been working as a professor and principal investigator at the International Institute for Carbon-Neutral Energy Research (WPI-I2CNER) in the Division of Thermal Science and Engineering. His research interests include thermally powered adsorption systems, heat and mass transfer analysis, and energy efficiency assessment. He has published more than 350 articles in peer-reviewed journals and international conference proceedings. He has edited five books and holds fifteen patents. Recently, he served as managing Guest Editor for Applied Thermal Engineering and Heat Transfer Engineering Journal. He serves as the editorial advisory board member of Applied Thermal Engineering Journal; Editor-in-Chief of Evergreen Journal.

COURSE COORDINATOR

E. Anil Kumar is Associate Professor in the Discipline of Mechanical Engineering, IIT Indore. He obtained his Ph.D. Degree from the Department of Mechanical Engineering, IIT Madras. His research interests are measurement of Thermodynamic and Thermophysical properties of solid state hydrogen storage materials, Carbon dioxide capture and sequestration. He has published more than fifty papers in peer reviewed International Journals and Proceedings of International and National Conferences.

WHO SHOULD ATTEND?

- Undergraduates, M.Tech./M.Sc. and Ph.D. science stream students. Any student with a basic background in thermodynamics/refrigeration will be able to follow these lectures and gain valuable information.
- B.Tech./B.Sc. and M.Tech./M.Sc. level teachers who wish to update their knowledge in an important special field of adsorption refrigeration.
- Executives, engineers and researchers from industry, service and government organizations including R&D laboratories who are engaged in adsorption cooling/refrigeration, desalination.

REGISTRATION FEE

Students (UG/PG): INR 4000/-

Research Scholars: INR 6000/-

Faculty Members: INR 10000/-

Foreigners: USD 300

Industry and Others: INR 15000/-

IMPORTANT DATES

Last date of Registration: 9th September, 2017

Course Schedule: 11h - 21st September, 2017

TRAVEL INFORMATION

Indore located in Central part of India in Madhya Pradesh State. It will well-connected by rail, road and air. The nearest railway station is Indore Junction and the nearest Airport is Devi Ahilyabai Holkar Airport. For queries regarding travel information, please contact the course coordinator.

ACCOMMODATION

Paid accommodation will be provided to participants on first-come-first-serve basis.

CONTACT DETAILS

For any information regarding eligibility fee payment, travel information, accommodation, etc., please contact the course coordinator via e-mail or phone.

Dr. E. Anil Kumar
Associate Professor
Discipline of Mechanical Engineering
Indian Institute of Technology Indore
Khandwa Road, Simrol, Indore,
Madhya Pradesh – 453552
Email: anil@iiti.ac.in
Phone: +91-7879779188
Website: http://me.iiti.ac.in/Anil.html
Link of Registration:
http://gian.iiti.ac.in/register.php