A Global Initiative of Academic Network (GIAN) Course on

Re-inventing fly ash into near-whitened material for generating white polymer composites

Venue: Advanced Nanoengineering Materials Laboratory, Department of Mechanical Engineering and Materials Science Programme, Indian Institute of Technology Kanpur, India

Broad Area: Chemical, Biochemical, Materials; Environment, Civil and Others

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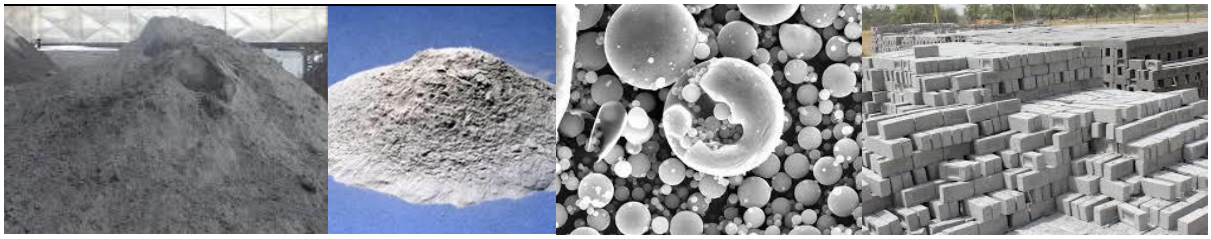
Overview [*Ref : Zaeni, A, Bandyopadhyay S et al.Fuel, 89, 399 – 404, 2010*]

Fly ash is a fine powder collected as the residue in the exhaust gases from combustion chambers of pulverized coal fired boilers at thermal power plant stations, which is recognized as an environmental pollutant. It is usually solid, irregularly spherical in shape; at times it is a cenosphere that is a hollow spherical shape. The size, chemical composition and the colour of fly ash vary depending on the coal type used in coal power stations. Because of the environmental problems created by the fly ash, considerable research has been undertaken on the subjects worldwide. These include synthesis, classifications, functionalization, handling, characterization, properties, fabrication of various composites and their applications as cement, concretes, bricks and blocks, lightweight aggregates, road construction, soil stabilization, asphalt filler, waste water treatment, acid treatment, scrubber sludge solidification, oil/gas well sludge solidification/detoxification, mineral wool, bricks for radiation protection, etc. In most countries fly ash is under-utilized (dumped).



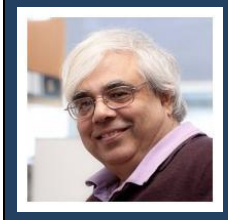
Acknowledgement: Researchers of fly ash

Recently, fly ash has been used as filler in polymer to produce particulate reinforced polymer composites, saving the other commonly used mineral fillers used in polymers, thereby helping the environment. Compared to other particulate fillers, used in polymers – such as calcium carbonate ($CaCO_3$), fly ash has advantages of being cheaper and lighter (density of calcium carbonate = 2.7 g/cc, density of fly ash = 2.2 g/cc). As a natural product however, fly ash has many disadvantages when added to a polymer to make a composite. One disadvantage is that fly ash contains contaminants such as unburned carbon, which makes grey-black colour of fly ash and gives a disadvantage for industry in general in specific applications that need rather brighter and reflecting surfaces.

UNSW Australia's Sri Bandyopadhyay / team developed a new technology whereby the colour of selective fly ash can be changed from grey black to near white (95 % whiteness of barium sulphate). This technology can hugely reduce the dumping of fly ash and use fly ash in white plastics, white cements, and white concrete. We are sure that this course will give significant contribution to the achievements of scientific knowledge in the areas of fly ash and its applications in various sectors.

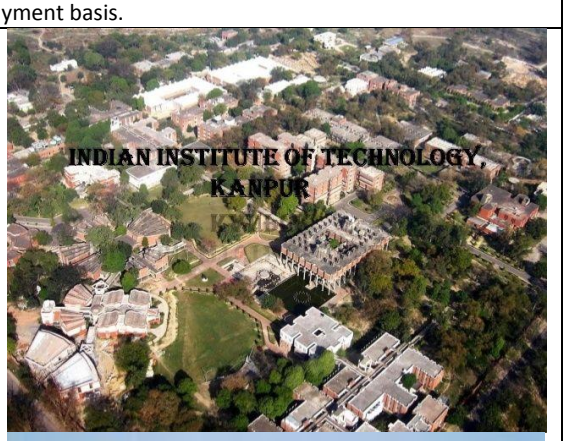
Course	**-Participants from Materials, Polymers, Ceramics, Chemical, Civil, Analytical areas** **-Course date: 26 Feb to 3 March, 2018** **-Number of participants for the course will be limited to fifty.**
You Should Attend If…	▪ You are an engineer or research scientist interested in designing/ developing new near whiten polymer – fly ash composites, as well as white coloured cement / concrete toughened with large quantities of fly as generated from coal power stations. ▪ You work in coal power plants as Management or engineer or researcher in coal power plant. Remember: India is the third largest country in the world using coal in producing fly ash – and much of these fly ash are grey black in colour. This means that if such grey black fly ash is added to white plastics, the colour of the fly ash – polymer composites become very dark and pretty close to dense black colour. ▪ You are a student or faculty from academic institution interested in learning how to do research on fly ash colour and size modification, and mixing with a range of polymers including thermoplastics, thermosets, and rubber; also working in cement and concrete, civil engineering, road-making
Fees	The participation fees for taking the course is as follows: **Participants from abroad : US $500** **Industry/ Research Organizations: INR 15000** **Academic Institutions: INR 5000 (Faculty and Staff), INR 3000 (Student)** The above fee include all instructional materials, computer use for tutorials and assignments, laboratory equipment usage charges, 24 hr free internet facility. The participants will be provided with accommodation on payment basis.

Faculty



Senior Visiting Fellow Dr Sri Bandyopadhyay is in the Faculty of Science in the School of Materials Sci & Engg at UNSW Sydney, Australia.. His research interests include Fly ash recycling technology which can be valuable and industrially gainful for polymer-matrix, metal-matrix and cement-matrix composites. In 2013, Campus Review Australia selected him as 1 of Top 5 INNOVATORS for his novel technology of changing the colour of fly ash from grey black to near white status – without using any chemical treatments.

Professor Kamal K Kar is a professor in the Department of Mechanical Engineering and Interdisciplinary Programme of Materials Science at Indian Institute of Technology Kanpur, India. Professor Kar has expertise in the areas of nanostructured carbon materials, nanocomposites, functionally graded materials, nanopolymers, and smart materials for structural, energy and biomedical applications. His research works have been applied in fuel cell, lithium battery, thermoelectrics, water purification, supercapacitor, high performance composites, catalysis, and biomedical implants. He has published more than 180 papers in peer-reviewed international journals, and contributed to 5 books on nanomaterials and their composites, and has 55 patents to his credit.



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