**Statistics**

- **Externally Funded Ongoing Projects**
  - Total Number: 500
  - Expenditure in 2013-2014: ~Rs 100 crore
  - Sanctioned Amount: ~Rs 370 Crore
  - Number of Project Staff: 590

- **Externally Funded Research Fellowships**
  - Total Number: 175

- **New Projects (2013-2014)**
  - Total Number: 228

- **Patents Filed (2013-2014)**
  - Total Number: 50

- **Technology Licensing (2013-2014)**
  - Total Number: 12

- **Research Papers (2013)**
  - Total Number of Journal Publications: ~900

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**Selected Government Funding Agencies**
- Department of Science & Technology
- Department of Biotechnology
- Council of Scientific & Industrial Research
- Ministry of Communications & Information Technology
- Board of Research & Nuclear Sciences
- Ministry of Environment & Forests
- Ministry of Power
- Indian Space Research Organisation
- Defence Research & Development Organisation
- Aeronautics Research & Development Board

**Selected Industrial Partners**

**Indian Partners**
- Samsung India Operations Ltd
- Manipal Press Ltd
- Larson & Toubro Ltd
- Tata Consultancy Services
- Rashtriya Ispat Nigam
- Power Grid Corporation of India Ltd
- CEAT Ltd
- Housing & Urban Development Corporation Ltd
- Bharat Heavy Electrical Ltd
- Sahasra Electronics Private
- Tata Steel Ltd
- Hindustan Aeronautics Ltd
- United Phosphorus Ltd
- Hindustan Petroleum Corporation Ltd

**International Partners**
- Boeing International
- Tata Steel Nederland Technology BV
- Procter & Gamble Company
- Eaton Corporation
- Chevron Corporation
- Pratt & Whitney Canada Corporation
- ETI Dynamics
- Earth Systems
- Instalaciones Inabensa
- Intel Corporation
- Samsung Electronis Co Ltd
- SAP
- Unilever
- General Electric
Unique Facilities

National Wind Tunnel Facility
It was established to meet the national needs in aeronautical and non-aeronautical activities. It houses the most versatile and efficient wind tunnel in India and is capable of testing at wind speed up to 80 m/sec.

Real Time Digital Simulator (RTDS)
A 6-rack Real Time Digital Simulation (RTDS) Facility carries out advanced research on power systems. The facility is the biggest amongst Asian universities and can simulate the transient behaviour of practical systems using a time step of upto two microseconds. It will be used for Synchrophasor Applications in Power Systems and Grid Integration of Wind Farm/Solar Photovoltaic using DC micro grids.

Advanced Center for Materials Science
A major initiative has been taken to rejuvenate and upgrade the facilities at ACMS. The main focus of this state-of the art facility is to support R&D activities of multiple disciplines across the institute by ensuring easy accessibility and maximum utilization of sophisticated analytical equipment, establish facilities covering every possible aspect of materials characterization.

Nanoscale Imaging Facility
The Institute is in the process of commissioning this facility for materials and biological science at a cost of about INR 15 crores. It houses a HRTEM and a cryo-TEM along with all the complete infrastructure/accessories requirements for materials and biological sample preparation. The HRTEM is FEI make Titan G2 60-300 model, the world’s most powerful commercially available STEM/TEM.

Engine Research Lab
It houses a flexible internal combustion system with provision to vary fuel injection strategies and timing, supercharging boost pressure, control and measurement of fuel pressure and injection pattern. It is equipped with an AC dynamometer, state of art intake air measurement system and gravimetric fuel flow meter. The engine also has provision for installation of endoscope for visualization of combustion at higher engine operating load.

Focused Ion Beam (FIB) System
It allows milling, imaging and deposition at nanometer scales. The FIB is a product of FEI Company (Nova 600 Nano Lab) and has a dual beam facility. The two beams are:

(i) An electron beam which has a spot size of 2—10 nm, beam current of 1—35 nA and energy varying from 500 eV to 30 keV. The electron beam is primarily utilized for scanning electron microscopy (SEM)
(ii) A Gallium (Ga) ion beam which has a spot size of 10—15 nm, beam current of 1—35 nA and energy varying from 5—30 keV. The Ga ion is utilized for machining of samples and fabrication of nanostructures.
SIDBI Innovation and Incubation Center (SIIC) fosters innovation, research, and entrepreneurial activities in technology-based areas. SIIC provides a platform for start-ups by budding entrepreneurs and intrapreneurs to convert their innovative ideas into commercially viable products. SIIC also provides services related to patenting and commercialization.

During the year 2013-14, 15 patents were granted and 12 technologies were licensed for commercialization. Over the years, 264 patents have been filed, 39 technologies have been licensed and 28 patents were granted.

Number of companies currently being incubated: 23
Number of companies graduated: 29
Recently Licensed Technologies

- Organic Thin Film Transistors and Methods for Their Manufacturing and Use
- Multielement focused ion beam system using an intense microwave plasma
- Microbe-Based Masters for Micro Contact Printing and Methods for Their Preparation and Use
- Four-Terminal Gate-Controlled Thin-Film Organic Thyristor
- Metal Nanoparticles-Doped Antibacterial Agents and methods of Preparation and use
- Methods for Fabricating Optical Lenses
- BFPT Thin Films Heterostructures with Giant Ferroelectric Response for Sensors and Actuators and Process Thereof
- An Organic Device with Thin Film Transistor Merged with Light Emitting Diode through Use of an Accumulation Layer in TFT as an Electrode
- Multiple criteria decision analysis in distributed databases
- Polymeric nanocomposite films with embedded channels and Methods of their preparation and use
- Nanobrushes and methods of manufacture and use
- Microfluidic Devices and Methods for their Preparation Use
- Hierarchically Porous Polymer, Carbon, Silica and Composite Carbon/Silica Monoliths with Ultra High BET Surface Area Synthesized by Combined Templated Sol-gel and Micro-phase separation for applications in Supported Metal Catalysis
- Multiple Criteria Decision Analysis
- Metamaterial Structures for Q-Switching in Lasers
- Systems and methods for dry processing fabrication of binary masks with arbitrary shapes for ultra-violet laser micromachining
- Thin Film Transistor with A Current-Induced Channel
- Smart Card Operating System (SCOSTA)
- A Coronary stent with nano coating of drug free polymer and a process for preparation thereof

Recently Granted Patents

- Flexible temperature sensor and sensor array
- Image Based Structural Characterization Of Fibrous Materials
- Four dimensional reconstruction and characterization system
- Doped Aluminum Oxides
- Miniature Lenses, Systems and Methods of Making the same
- ASJQ: Skylines with aggregate operations over multiple relations
- Phase transformable cryogel scaffold for tissue engineering
- Micropattern Generation with pulsed laser diffraction
- A Method of varying threshold voltage in MOSFETs
- A method and apparatus for the formation of patterns on surfaces and an assembly and alignment of the structure thereof
- Carbon nanotube(s) Coated Cutting tool(s) and a method of manufacture thereof
- Functionally graded wide-band polymeric composites for microwave absorbers and method of manufacturing same
- Novel Liquid-solid radially cross-flow multi-stage fluidized bed contactor
- New duplex adsorption process for fractionation of gas mixture
- A Carbon nanotubes coated long fiber and a process for preparation thereof
Students’ Corner

Formula Racing Car

The Society of Automotive Engineers Club at IIT Kanpur built a Formula Racing car. This is the first such student effort in the institute to make a large engineering device having a number of sub-systems. Most of the components except engine, tyres and wheel rim have been designed and manufactured in-house by the team members themselves. The car is powered by a Royal Enfield 500 cc engine and it reaches its top speed within 5 seconds. It was designed and fabricated inside IIT Kanpur with active support from the newly opened Tinkering Laboratory.

Abhyast

A team of 8 undergraduates designed an Unmanned Ground Vehicle (UGV) that could successfully perform simple path planning and obstacle avoidance. Body engineering aspects of the vehicle were also factored in to make it suitable for unstructured landscape. After successfully navigating in an arena filled with randomly moving obstacles, complexities were introduced into the objectives for Phase II of the project. Phase II mainly aimed at developing gas sensors for detection and monitoring of gases in a chemically hostile environment. The endeavour is supported by The Boeing, USA.

NERD

NERD is a campus magazine meant for providing students a platform to share the excitement of science and technology. The magazine is created by students - be it their research work, hobby projects, interviews with scientists, or book reviews.

Visit us at http://www.iitk.ac.in/nerd

Promotion of Work Experience and Research (POWER)

POWER is a student body aiming at promoting student ideas and a culture of student led technical projects by providing work-experience opportunities.

Visit us at http://www.iitk.ac.in/dord/power
Some Recent Projects

MHRD has funded a project to set up a Mathematical Sciences Initiative at IIT Kanpur. The main aim of this centre is to create an eco-system that facilitates high quality national and international research programs and research collaborations in various domains that comprise Mathematical Sciences.

MHRD has funded another project to set up a Center for Material Modelling Mechanics & Applications. The major objective of the project is to create an open source database of material properties and computer models for predicting their mechanical behavior.

The Project titled Building a Novel System for Soot: Measurement, Toxicity Assessment and Source Identification sponsored by MHRD aims to build a system for ambient soot measurement. Other goals include toxicity assessment and source identification of soot.


The project Center of Excellence for Chemical Biology funded by MHRD will focus on active research in chemistry and biology of direct medical relevance: infectious disease, cancer, neurodegenerative diseases, and others of utmost urgency to the nation.

The objective of the MHRD funded project National Facility for Archeological Studies of Heritage Structures is to set up a National facility in the area of applications of science and technology in archaeology and Cultural Resources Management (CRM).

The Project SandDHI: Scientific Study of Indian Knowledge Systems funded by MHRD is envisaged as an interactive platform for displaying the finest intellectual achievements of the Indian mind in the field of science and technology as manifested in its material culture.

DST has funded a major project titled Design and Development of an Autonomous Helicopter. The objective of the project is to develop an “Autonomous Mini-Helicopter” weighing only a few kilograms but incorporates most of the functions of a real life helicopter and achieves autonomous. HAL has also funded a major project on Development of autonomous rotary unmanned aerial vehicle in 10 Kg weight class.

The Wellcome Trust DBT India Alliance funded a major project on Structure, Function and Novel Signaling Pathways of the Noncanonical G Protein Coupled Receptors. The major goal of this project is to visualize the three-dimensional structure of selected GPCRs at atomic resolution by X-ray crystallography. Such structural visualization should facilitate novel drug design as a potential treatment for several human diseases including colon cancer, malaria and inflammation. The project is being carried out in the Department of Biological Sciences and Bioengineering.
Research Centers

The Institute has 10 research centers/units in interdisciplinary areas endowed with state-of-the-art facilities.

- Center for Environmental Science and Engineering
- National Information Center of Earthquake Engineering
- Thematic Unit of Excellence
- SAMTEL Center for Display Technologies
- Syndicate Bank Entrepreneurship Research and Training Centre
- BSNL-IITK Telecom Center of Excellence
- Center for Laser Technology
- Center for Mechatronics
- Advanced Center for Materials Science
- Advanced Center for Electronic Systems

Major achievements of a few Centers/Units

Thematic Unit of Excellence

- Nanolens and nanolens array fabrication by self-assembly
- Non-fouling and reusable pressure-sensitive adhesive
- Micro/nano functional carbon fiber webs for environmental remediation
- Technology for large area, ultra-fast micro-patternting of coatings

SAMTEL Center for Display Technologies

- 1.0 and 1.5 inch full colour OLED display
- Organic Solar cell module
- A method for printing micron size width of nano gold ink
- A major project on flexible electronics funded by DeitY is expected to start soon

BSNL IITK Telecom Center of Excellence

- Digital Mandi for the Indian Kisan
- Power Supply for telecom applications
- Strategies for telecom operators to switch to IPv6 from IPv4

Center for Lasers and Photonics

- Design and development of broadband, tunable fiber laser
- Hand held probe for cervical cancer detection
- Real-time vein visualization tool
- Solar cell defect characterization tool

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