



# TEN YEARS OF **IISER PUNE**



IISER Pune has been established in 2006 by the Government of India's Ministry of Human Resource Development with the goal of integrating high quality research with undergraduate teaching. Along with other IISERs across the country, IISER Pune has been declared an Institution of National Importance by inclusion into the NIT Amendment Act of 2012. Each IISER is an autonomous institution awarding its own Master's and Doctoral degrees.

## Vision and Mission

- Establish scientific institution of the highest caliber where teaching and education are totally integrated with state-of-the-art research
- Make learning of basic sciences exciting through excellent integrative teaching driven by curiosity and creativity
- Entry into research at an early age through a flexible borderless curriculum and research projects



*...where tomorrow's science*





## *Celebrating a Decade of* IISER Pune

IISER Pune is completing ten years in 2016. Starting in August 2006 with the first batch of 44 students and 5 visiting faculty in a small space of 10,000 sq. ft at NCL Innovation park, we have now grown to become ~1200 students, 106 faculty and 60 staff members and have moved into a 98 acre campus with 80,000 sq mt of residential space and 117,000 sq mt of academic space. The campus has all facilities of a modern residential teaching and research institute.

More than 350 students have graduated with BS MS degree and about 60 have received their PhD degrees. Over 1000 research papers have been published. The IISER chain of Institutes has been ranked fourth in India by *Nature Index*.

The celebrations of a decade of IISER Pune were launched in the presence of Honorable Union Minister of Human Resource Development Smt. Smriti Zubin Irani as the Chief Guest of the function. As part of our 10 year celebrations, we plan to have a series of lectures and events in topics such as affordable healthcare, gender equity in science education and research, lectures from thought leaders, students' research conferences and more.

As we celebrate our achievements, we are acutely aware of the future expectations of stakeholders and the challenges ahead. We need to concentrate not only on basic research for its own sake, but also address the societal applications. I extend my warm congratulations to each of us involved in building this institute together and my best wishes as we continue on this journey to becoming a leading research and teaching institute in the world.

K.N. Ganesh  
Director, IISER Pune

# Major Milestones

## Inauguration of IISER Pune

August 16, 2006



Inauguration of IISER Pune activities at NCL Innovation Park by Prof. N. Kumar and Dr. R.A. Mashelkar

## Functioning from Transit Campus

at Sai Trinity Building  
August 2008 – August 2013



The institute started functioning with 5 faculty members and the first batch of 44 students



## Setting up of IISER Pune Main Campus



August 18, 2007 : Dr. S. Sivaram and Dr. K.N. Ganesh exchange the agreement document for allotment of 98 acres of CSIR-NCL land to IISER Pune in the presence of Prof. N. Kumar and Prof. C.N.R. Rao



April 1, 2010: The then Prime Minister Dr. Manmohan Singh unveils the Foundation Stone for the Main Campus

Hall of Residence-4 (HR4), the first building to come up on the IISER Pune main campus, wore many hats from being a student hostel to offering lecture rooms and office space. This building is now a Guest House and Convention Centre.



June 15, 2014: Inauguration of the Main Building and dedication of the campus to the nation by Hon'ble President of India Shri Pranab Mukherjee



February 19, 2016: Minister for Human Resource Development Smt Smriti Irani launched celebrations of 10 years of IISER Pune







# Academics

## **Bachelor of Science-Master of Science** (BS MS) Dual Degree Program

- Emphasizes inter-disciplinary nature of contemporary science in teaching and research
- Years 1-2 impart basic training in Biology, Chemistry, Earth & Climate Science, Humanities & Social Sciences, Mathematics, and Physics disciplines;
- Years 3-4 constitute optional advanced courses in one or more disciplines; and Year 5 constitutes a thesis-based research project/internship
- Admission is granted through a joint entrance process organized by all 5 IISERs (see <http://www.iiseradmission.in/> for more details)

## **Integrated PhD Program**

- Offered in Biology, Chemistry, Mathematics and Physics and for bachelor-level students
- Comprises of an intense 1.5-2 year coursework followed by research

- Provides a head start in identifying research areas toward a PhD
- Admission is carried out through a national-level selection conducted separately for each discipline

## **PhD Program**

- Offered in Biology, Chemistry, Earth & Climate Science, Mathematics and Physics for master-level students
- Comprises of ~1-year intense coursework followed by research
- Admission is carried out through a national-level selection conducted separately for each discipline

## **Postdoctoral Program**

- Offered across all disciplines and applications invited all round the year, the IISER Pune postdoctoral program provides Postdoctoral Fellows the option to be independent or be associated with a research group at the institute depending on their research focus and necessary infrastructural support



## Key Achievements

IISERs ranked

**2nd** in India,

**41st** in Asia Pacific,

and **137th** at

the global level for institutional research output in the academic sector by *Nature Index*

WF Count 2015, *Nature Index* 2016 Tables for the duration of 1 January 2015 to 31 December, 2015

**1 US patent**

granted and 9 filed (Indian and foreign)

**1000+**

research publications so far

**80+** papers

published from research carried out by undergraduate students

**Accreditation**

of the Chemistry undergraduate program by the Royal Society of Chemistry


**>90%**

of students found placement in prestigious research institutes in India and abroad with some of them joining Industry

Of these, >60% chose to pursue a PhD program

**7+** research

centres/units focusing on basic as well as applied research



Generated external  
research grants  
(~ INR 200 crores)  
amounting to

**>20%** of the  
total institute budget

**Member  
Organization  
of the CERN Large  
Hadron Collider's  
CMS  
Collaboration**

IISER Pune is now a  
**Member of the  
Association of  
Indian  
Universities**

**Established  
partnerships**

with **20+**  
International  
Universities/Institutes

**Among the  
Faculty are**

**7 Fellows  
1 Vice-President  
13 Young Scientist  
Medalists of the  
Indian National  
Science Academy  
(INSA), New Delhi**

**9 Fellows  
1 Vice-President  
of the Indian Academy  
of Sciences (IASc),  
Bangalore**

**4 Young Scientist  
Platinum Jubilee  
Awardees of the  
National Academy of  
Sciences India (NASI),  
Allahabad**

**2 Fellows of The  
World Academy of  
Sciences (TWAS),  
Trieste**

**1 G.D. Birla Awardee**

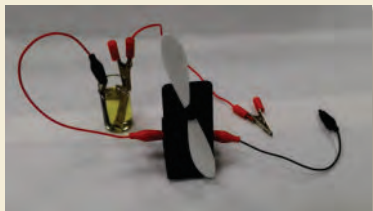
**1 H.K. Firodia  
Awardee**

**1 Whitley Awardee**

...and many others who  
have been recognized  
for their research  
excellence



# Research Highlights



## Novel ways to harness light energy

As a new means to harness light energy, Dr. Musthafa's research group has developed a battery that can produce power from a light source. This development could potentially allow solar energy to be stored directly in a battery along with paving the way to generating a sustainable photo battery.

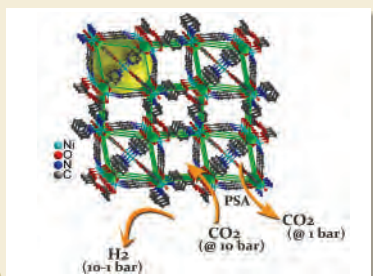
*Journal of Physical Chemistry C* (2015) 119(25):14010-14016



## Deciphering the Asian Elephant's genome

In collaboration with researchers at IISc, Bangalore, Prof. Sanjeev Galande's team has sequenced the genome of the Asian Elephant and analyzed the transcriptome sequences. The team has identified more than 1500 genes, a significant subset involved in the sense of smell, which set apart the Asian elephant from its African counterpart.

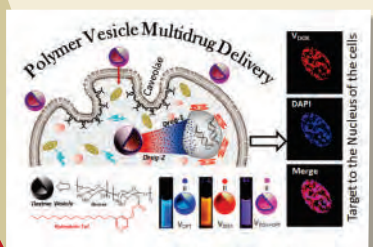
*Journal of Biosciences* (2015) 40(5):891-907



## Making the most of fossil fuels: Selective capture of carbon dioxide

Dr. R. Vaidyanathan and team have developed a new material that can selectively capture and remove carbon dioxide (CO<sub>2</sub>) from a gaseous mixture with hydrogen (H<sub>2</sub>). This can facilitate a more efficient purification of hydrogen, a known non-polluting fuel. The new material could be eventually developed for commercial use in an alternative energy-efficient method for producing usable energy from fossil fuels.

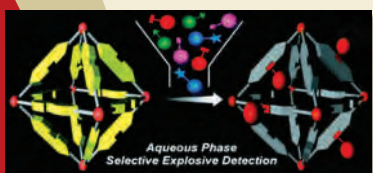
*Science Advances* (2015) 1(11):e1500421



## Towards a more efficient drug delivery system

Research groups of Dr. M. Jayakannan and Dr. Nagaraj Balasubramanian have developed an efficient polymer-based dual drug delivery system for slow and fast release of cancer drugs. The teams are working on achieving a higher efficiency and specificity of uptake of relevant drugs by cancer cells.

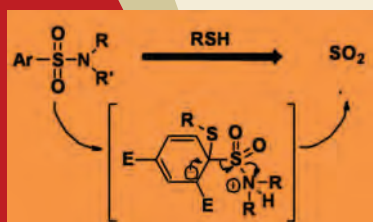
*Nanoscale* (2014) 6:11841-11855; *Biomacromolecules* (2012) 13:3627-3640



## Detection of explosives

Dr. Sujit Ghosh and team have designed and synthesized a metal-organic framework that can selectively detect a highly explosive compound which is quite stable in the presence of water. It can potentially be useful for tracing buried and underwater explosives near ordnance bases for environmental monitoring.

*Chemical Communications* (2014) 50:8915-8918



## Fighting tuberculosis

Dr. Harinath Chakrapani's group is developing new sources of sulfur dioxide to explore their therapeutic potential against tuberculosis. The group has found that thiol-activated sources of sulfur dioxide are capable of inhibiting *Mycobacterium tuberculosis* at low, micromolar levels.

*Free Radical Biology and Medicine* (2015) 84:344-354; *Chemical Communications* (2012) 48:10325-10327



## Long distance signaling in plants

Dr. Anjan Banerjee's group is trying to understand the molecular mechanisms involved in the formation of potato tubers. As a proof of principle of their hypothesis, they have generated aerial potatoes under conditions of micro RNA 156 (miR156) overexpression.

*Plant Physiology* (2013) 164:1011-1027



## Teaming up with the world to find new particles

As part of the CMS Collaboration at the Large Hadron Collider (LHC), CERN (The European Organization for Nuclear Research), the highest energy accelerator in the world, research teams of Dr. Seema Sharma and Dr. Sourabh Dube have been participating in the successful running of the CMS experiment and in using the collected collision data to probe for phenomena beyond the Standard Model.

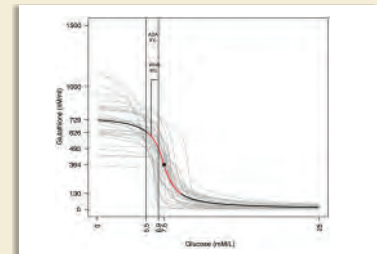
<http://www.iiserpune.ac.in/~ehep/index.html>



## Assessing diabetes treatment outcomes

Dr. Pranay Goel's group in collaboration with researchers at University of Pune has studied oxidative stress alongside glucose levels and developed a mathematical model that can predict the rate at which recovery progresses in newly diagnosed diabetic patients. Thus, model estimates can potentially be used in reassessing treatment strategy.

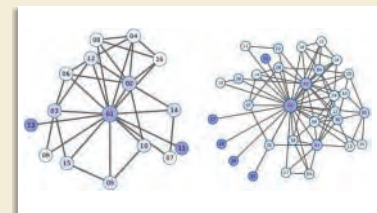
*PLoS One* (2014) 9(6):e100897



## Analysing complex networks

Prof. Ambika and Dr. Chandrasheel Bhagwat have investigated divisibility properties of natural numbers using the framework of a complex network. Prof. Ambika's group has also proposed a model called "RAIN (RANdom Interacting Network) model" that predicts the dependence of international flight connections between Europe and USA, solely on the basis of domestic connections in these two regions.

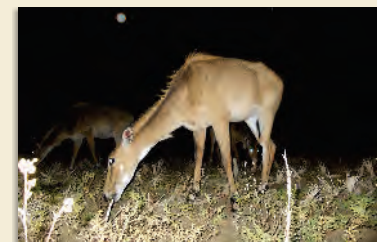
*Nature Scientific Reports* (2015) 14280; *Nature Scientific Reports* (2015) 18183



## Crop damage in wildlife protected areas

In a project partly funded by the Rajeev Gandhi Science and Technology Commission of the Maharashtra State Government, Prof. Milind Watve and team have proposed a new method for realistic estimation of crop damage near wildlife protected areas, which could be beneficial to the farmers as well as for wildlife conservation efforts.

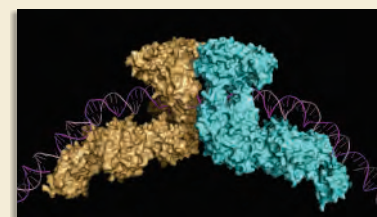
*PLOS One* (2016) <http://dx.doi.org/10.1371/journal.pone.0153854>



## Unraveling the mysteries of molecular scissors

Dr. Saikrishnan Kayarat's team has uncovered a new way that bacteria use to cut and destroy foreign DNA. Restriction endonuclease enzymes of the bacteria seem to shred, and not slice, foreign DNA. The team found this by solving the first atomic resolution x-ray crystal structure of a motor-driven restriction endonuclease bound to DNA.

*Nature Chemical Biology* (2015) 11: 870-877



IISER Pune has active MoUs with several foreign universities and organizations. These allow the institute in building academic relations and cooperation in terms of research collaborations, pedagogy development, and student exchange.

### UK

University of Bath  
University of Glasgow  
Southeast-India  
Partnerships Network  
Consortium of British  
Varsities led by the  
University of Surrey

### France

Ecole Normale Supérieure  
(ENS) de Lyon  
The Centre National De La  
Recherche Scientifique  
(CNRS)  
Embassy of France in India,  
Science and Technology  
Service  
Alliance Francaise de Pune

### Germany

Max Planck Institute of  
Colloids and Interfaces,  
Potsdam  
Georg-August-Universitat  
Gottingen  
Leibniz University Hannover  
The Max-Planck-Gesellschaft  
(MPG), Germany (Joint MoU  
with all IISERs)

### Italy

University of Parma



### USA

New Mexico  
State University  
Ohio State  
University

### Canada

IC-IMPACTS Centre of  
Excellence hosted at  
The University of British  
Columbia  
Enovex Technology  
Limited

### Singapore

Bioinformatics Institute  
National University of  
Singapore

### Japan

School of Life Science,  
SOKENDAI (The Graduate  
University for Advanced  
Studies)  
Brain Science Institute, RIKEN  
International Center  
for Materials  
Nanoarchitectonics (MANA),  
National Institute  
for Materials Science,  
Tsukuba  
Hokkaido University

### Australia

University of  
Melbourne



# IISER Pune At a Glance

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90+ acre campus

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700+ undergraduate students

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450+ PhD and Integrated PhD students

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400+ BS MS and PhD degrees awarded

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100+ Faculty

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