



Embassy of India, Berne

# INDIA SCIENCE AND INNOVATION WEEKLY

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*Ask the right questions, and nature will open the door to her secrets  
- Dr. C.V. Raman, The Nobel Prize in Physics 1930*

## Indian researchers discovered three supermassive black holes

Indian researchers at Indian Institute of Astrophysics (IIA) discovered three supermassive black holes from three galaxies merging together to form a triple active galactic nucleus, a compact region at the center of a newly discovered galaxy that has a much-higher-than-normal luminosity. This rare occurrence in our nearby Universe indicates that small merging groups are ideal laboratories to detect multiple accreting supermassive black holes and increases the possibility of detecting such rare occurrences. The IIA scientists further explained that if two galaxies collide, their black hole would also come closer by transferring the kinetic energy to the surrounding gas.

## TERI, New Delhi developed an Advanced Oxidation Technology (TADOX)

To enhance waste water reuse at lower cost, the Energy and Resources Institute, New Delhi developed **Advanced Oxidation Technology, TADOX<sup>R</sup>** which could reduce less dependence and load on biological and tertiary treatment systems and help achieve Zero Liquid Discharge (ZLD). The technology could also bring down capital expenditure on ZLD by 25-30% and operating expense by 30-40% for industrial wastewater treatment. Department of Science and Technology (DST), GoI- Water Technology Initiative (WTI) has supported TERI to develop this technology at bench scale collaboration ONGC Energy Centre Delhi.

## Indian researchers developed unique technology for direct generation of Hydrogen from agricultural residue

Researchers from Agharkar Research Institute, Pune, an autonomous institute of the Department of Science and Technology (DST), GOI, in collaboration with Sentient labs of KPIT Technologies developed a unique technology for direct generation of Hydrogen from agricultural residue. Researchers also confirmed that this technology is 25% more efficient as compared to conventional anaerobic digestion processes used today as the two-stage process eliminates the pretreatment of biomass, thus making the process economical and environment friendly and this breakthrough of generating hydrogen from unutilized agricultural residue would help India to become self-reliant on energy resources.

## CSIR-CFTRI Mysore developed novel technology to enhance biogas production of Fat-rich sludge from dairy industry

Indian Scientists from Council Of Scientific and Industrial Research-Central Food Technological Research Institute (CSIR-CFTRI) Mysore with support from the Waste Management Technology program of the Department of Science & Technology (DST), Govt. of India, developed high-performance bio reactor system integrated with sustainable pre-treatment process for enabling anaerobic digestion of complex fat-rich sludge from dairy industry. The technology has been further integrated with membrane bioreactor based-wastewater treatment to enable zero liquid discharge in the dairy industry.

## Special Update: Scientists at INST Mohali developed large-scale reactor for cost-effective production of hydrogen using sunlight and water

For the first time, Indian scientists at Institute of Nano Science and Technology (INST), Mohali, an autonomous institute of the Department of Science & Technology (DST), Govt. of India developed a prototype for cost-effective production of hydrogen using sunlight and water, which operates under natural sunlight to produce hydrogen (around 6.1 L in 8 hours), which is a cost-effective and sustainable process. Scientists used an earth-abundant chemical called carbon nitrides as a catalyst for the purpose. Hydrogen generated in this manner could be used to power the transformers and e-vehicles, electricity generation through fuel cells in remote tribal areas & hydrogen stoves etc.