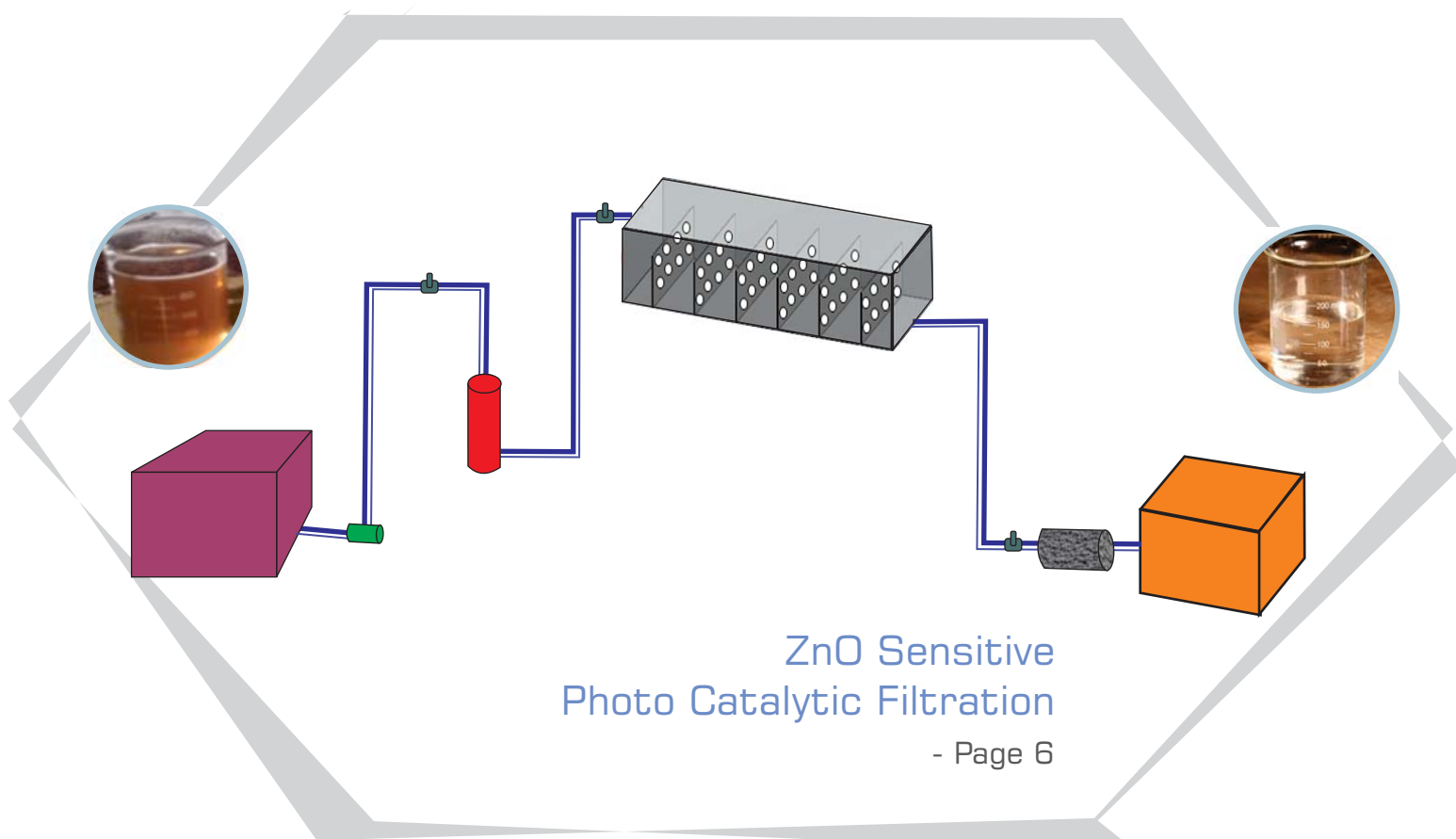




R&D Newsletter

Indian Institute of Technology Kanpur



ZnO Sensitive
Photo Catalytic Filtration

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Workshop on Innovation and the Society

Members of SIIC, IITKanpur and two SIIC incubatee companies, Prosoc Innovators and Promorph Solutions, actively participated in a two-day workshop on 'Innovation and the Society' conducted by Jabalpur Academia Initiative and chaired by Prof. Aparajita Ojha of the IIITDM Jabalpur on December 5th and 6th, 2016. Several prominent academic institutions in Jabalpur area were part of this event. Innovation challenge in terms of concept paper, poster and/or model development was organised for the sectors which include Agricultural, Social, Healthcare, Smart Living, Frugal and Technological Innovation.

Padma Shree award winning Professor Anil Gupta from National Innovation Foundation was among the keynote speakers who gave a talk on a goal towards an empathetic design. Prof. Sameer Khandekar, Associate Dean, Innovation and Incubation (ADII) IIT Kanpur and Dr. Abhijit Sathe from IIT Kanpur gave information on social entrepreneurship and funding opportunities in the INVENT program. Two incubatee companies from SIIC presented their views on social impact of innovation.



Social Entrepreneurship Event at Integral University, Lucknow

A social Entrepreneurship event was jointly conducted by SIIC, IIT Kanpur and Entrepreneurship Development Cell of Integral University, Lucknow in association with E-cell of IIT Kanpur on November 3rd, 2016. Around 30 entrepreneurs, dignitaries from social entrepreneurship groups and 300 students attended this workshop. The theme of this workshop was social entrepreneurship. The Talks focused primarily on explaining the meaning of social entrepreneurship and benefits it provides to the society and especially to the people at the bottom of pyramid. In addition to the local faculty members, following attended this event: Dr. Abhijit Sathe, Prof. Sameer Khandekar and Mrs. Sudha Selvaraj from SIIC, Mr. Chand Das and Mr. Paramjyoti Chattopadhyay from Villgro and Mr. Shantanu Das from DFID. A workshop on entrepreneurship was also conducted by the E-cell of IIT Kanpur, in which, students were encouraged to think of a problem, possible solutions and approaches. It was attended by all students of Integral University.





IP: A Strategic Enabler for the Scientific & Research Community A training & awareness program

Following up with the Startup India Action Plan, as part of the INVENT program, SIDBI has organized IPR training & workshop programs for Incubates working in social sector at IIT, Kanpur on 12th December, 2016. Around 30 participants gathered at the event and the discussion over criticalities of IP protection & Licensing came out to be fruitful. Dr. Anand Kumar Biswas, Director- Business Development at TekIP® Knowledge Consulting Pvt. Ltd. and Mr. Debankur Bandyopadhyay, Principal Mentor, Fil-O-Noé Mentors Private Limited have given detailed insights over IP protection with modalities of PCT filing and Licensing of Innovative products to the participants.

This seminar was very helpful for the social entrepreneurs, students and faculty members for protecting IP rights of their inventions and licensing out their technologies.



SIIC Success Story: Award for E-Spin Nanotech

- The promoter E-Spin Nanotech Pvt. Ltd. Dr. Sandip Patil, has been awarded as one of the top ten outstanding young persons in the city of Kanpur. The award has been given by JCI-Kanpur, for his technology innovation and his contribution to the economic growth of the city. He is the first person from IIT Kanpur who has been recognized and awarded by JCI.
- E-Spin Nanotech Pvt. Ltd. has also been selected as top Nanotechnology company in India by Silicon India:

<http://www.siliconindia.com/nano-technology/e-spin-nanotech-catid-63-cid-715.html>

Team AUV, IITKanpur 1st runner up in its debut

IIT Kanpur AUV Team, for their robot named Varun, won the second position in their debut at the 5th National Student Autonomous Vehicle (SAVe) organized by the National Institute of Technology (NIOT), under the Ministry of Earth Science at Chennai, India. The competition aims to provide a platform for students to explore the underwater technologies and kindle their interest in marine research.

The team behind the design and development of Varun consists of a group of 15 undergraduates from a variety of majors including Mathematics, Physics, Aerospace, Electrical, Chemical and Computer Sciences. The work divided into three subsystems namely Mechanical, Electrical and Software development. Varun, with its five degrees of freedom, has a depth of operation of 50 meters and can run up to two hours continuously. Its sensor suite comprising of dead-reckoning sensors namely inertial measurement unit and depth sensor along with the front and bottom facing cameras provide Varun the ability to navigate underwater seamlessly and perform a variety of tasks such as follow lines underwater, detect buoys and gates, and drop markers when required.

During the event held in December, the experts present were impressed by the neat design and functionality of Varun. The competitors at the event were from institutes all over the nation. Nevertheless, Varun had an edge, thanks to the careful planning and implementation done by the team over the span of two years. The team promises to bring more surprises in the future and a better vehicle for next competition.



Development of Control and Protection for Hybrid Renewable Integration

PI: Prof. S. P. Das, Dept of Electrical Engineering
 CO-PI: Prof. Sandeep Anand, Dept of Electrical Engineering
 Prof. S.R. Sahoo, Dept of Electrical Engineering
 Prof. A. Mohapatra, Dept. of Electrical Engineering
 Sponsor: NTPC NETRA



Increasing demand for energy and rapid depletion of conventional energy sources has promoted integration of renewable energy sources as a distributed generation (DG) unit. DG offers security and high availability of the supply. Further, it leads to low distribution losses, easy scalability, and remote electrification. Power electronic converter (PECs) are required to interconnect various renewable sources and storage elements to the ac grid. It is desirable that power supplied by the sources and storage elements must be shared in proportion to their scheduled values as determined by distribution system operator (DSO). Suitable master controller is required to achieve this. Further, due to integration of renewable sources and bidirectional power flow in the distribution lines, appropriate protection scheme needs to be developed. Communication technologies play an important role in both, control and protection of these systems.

NTPC intends to utilize IIT Kanpur expertise to design and develop the controller and protection scheme for the aforementioned system. The developed controllers and protection scheme would be tested as controller-in-loop on real time digital simulation (RTDS) platform.

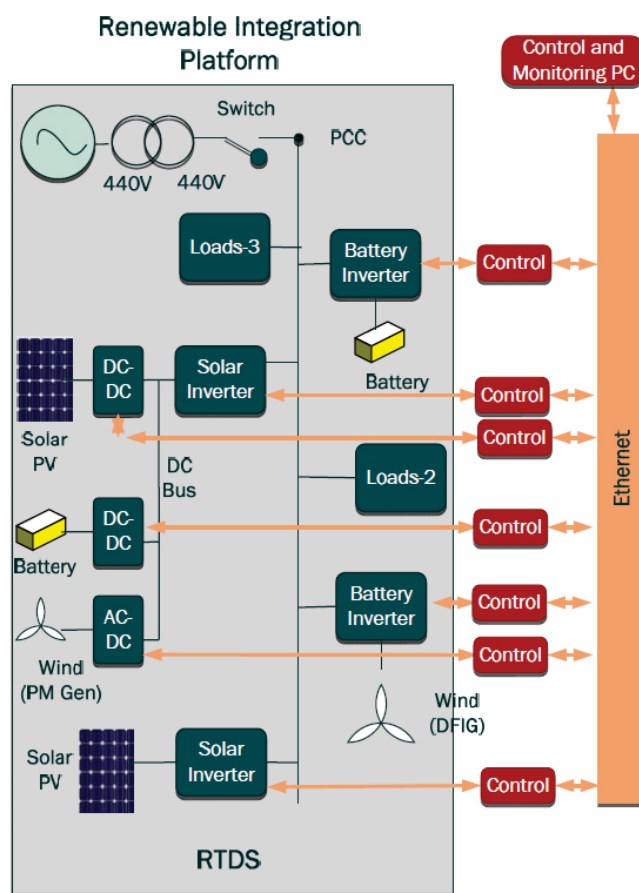


Figure: A typical hybrid renewable integration scheme

The Main focus areas of this project are:

- Development of Local Controllers and Master Controller for power sharing among sources and storage elements.
- Development of Communication Architecture for communication between various sources, storage elements and local distribution grid.
- Load control and protection scheme of the Microgrid.

Recently Registered Projects

Commissioning of a Pilot Plant of 10 KLD Capacity Comprising of ZnO based Sensitive Photo Catalytic Filters for Visible Light Catalysis and Carbon Nano-Mat Fiber Filter based Treatment of the Effluent of CETP, Jodhpur



PI: Prof. Shantanu Bhattacharya , Dept. of Mechanical Engineering
Co-PI: Dr. S.K. Singh, Professor, Dept. of Civil Engineering,
MBM Engineering College and Jodhpur
Dr. Urmila Brighu, Dept. of Civil Engineering, MNIT, Jodhpur

Sponsor: Department of Science & Engineering

Industrial Collaborator: Common Effluent Treatment Plant, Jodhpur

The project is about providing a solution for industrial effluents consisting of organic dyes which are harmful to environment and are not dischargeable. The solution is provided by using the soil mediated photocatalytic remediation of industrial dye present in the effluents by using ZnO nanostructures in presence of sunlight. The collaborator for this activity is CETP jodhpur and the goal is to setup a plant of 10 KLD capacity which would be based on solar energy.

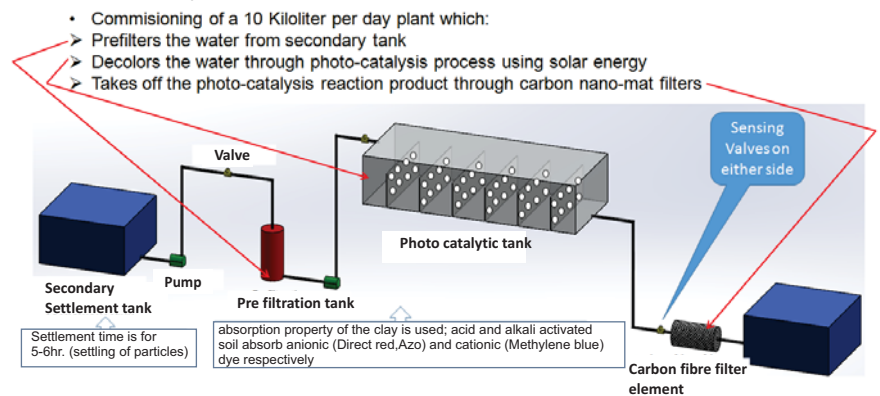


Figure: A brief planned layout of the plant and also some details of the process planned.

Development of Microwave Sensor System for Humanitarian Technology Applications

PI: Prof. M Jaleel Akhtar, Dept. of Electrical Engineering

Sponsor: Department of Science & Engineering



The aim of this project is to develop a microwave sensor system for humanitarian technology applications with main focus on the agricultural and food sectors of the society. For the food sector, the main focus would be to detect contamination in various edible oils which is one of the main challenges of the Indian society today. Similarly, for the agricultural sector, the project would involve characterizing various types of oils available in the market such as mustard oil, coconut oil, olive oil etc. in order to determine their dielectric signatures in the microwave frequency range. The overall project would involve development of various types of planar RF resonant sensors with high sensitivity in order to detect minimum amount of contamination in the base product. The outcome of this project can also be applied for biomedical applications to test blood samples in order to explore the possibility of detecting diseases at an early stage.

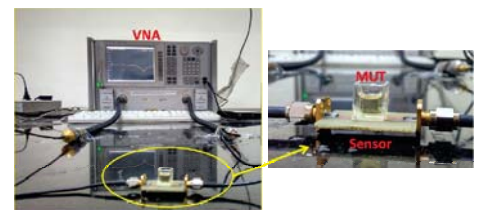


Figure: RF Sensor with the test liquid and Vector Network Analyzer (VNA)

Investigating Angular Coherence Properties of One-Photon and Entangled Two-Photon Fields for Quantum-Information based Applications



PI: Prof. Anand Kumar Jha, Dept. of Physics

Sponsor: Science and Engineering Research Board, DST

The existing methods for getting the orbital angular momentum (OAM) spectrum information suffer from either very poor efficiency or very strict interferometric stability requirements or too much loss. In this project, a way of measuring the OAM spectrum which only requires a single-shot measurement in an interferometer is being proposed. Since the method is interferometric, it has very high efficiency, and also since it only involves single-shot measurements, the stability requirements are much less stringent. It is also planned to extend the above technique and develop it for measuring the Schmidt spectrum of entangled two-photon fields produced by parametric down-conversion, which is one of the most widely used processes for producing entangled two-photon fields. The Schmidt spectrum quantifies the dimensionality of the OAM basis. Therefore a single-shot measurement of the Schmidt spectrum has a lot of important experimental implications.

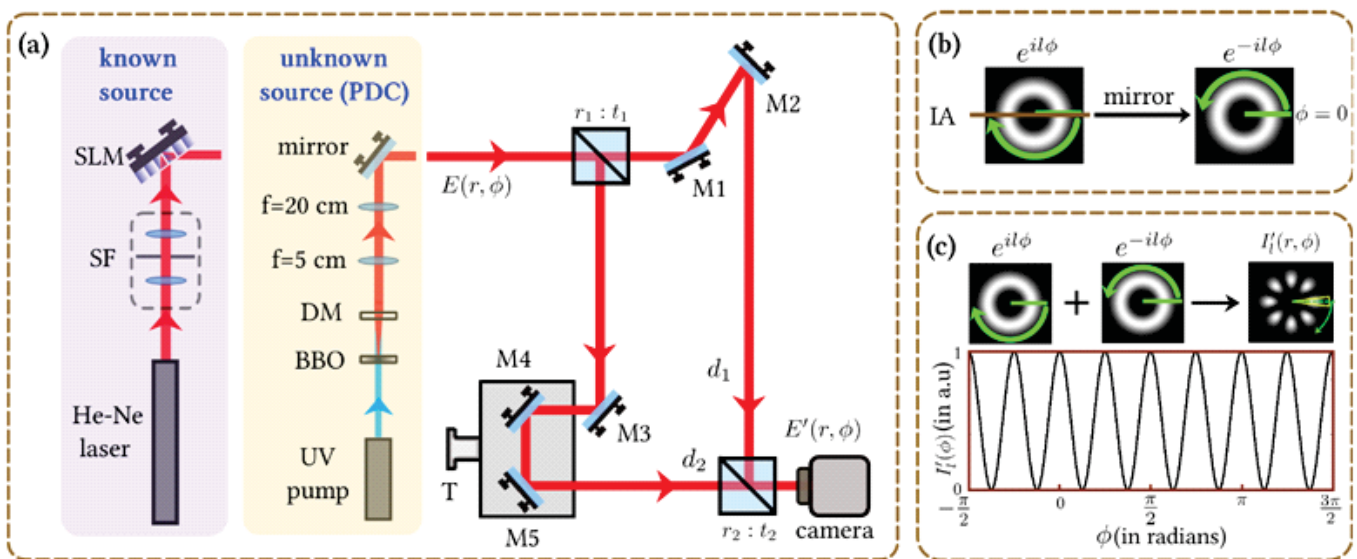


Figure: (a) Schematic of the experimental setup comprising of a Mach-Zender interferometer with odd and even number of mirrors in the two arms; (b) a mirror introduces an image inversion on the transverse profile of a beam about the inversion axis (IA); (c) The output interferogram for an input beam with OAM mode index

Integrated Geophysical Study for Delineating Details Subsurface Structures and Possible Mineral Deposits Around Madawara Region, Lalitpur, Uttar Pradesh, India



PI: Prof. Animesh Mandal, Dept. of Earth Sciences
Sponsor: Science & Engineering Research Board, DST

Exploring new mineral deposits is an urgent need of our country to sustain the increasing demand of the mineral resources and thereby economic growth of the country. Researcher has reported occurrences of Ni, Cu and platinum-group elements (PGE), chromite and other base metals within the ultramafic rocks of the Madawara Igneous Complex based on geochemical and petrographical analysis. However, no detail investigation has been performed to understand the subsurface structural features, depth extension and lateral continuity of the probable prospective zones. The proposed integrated geophysical study (using gravity, magnetic, electrical and electromagnetic method) will therefore, aim to fulfil that gap and help to open up potential zones for base metal, chromite ores and PGE exploration. This work will also impart an extra input to the existing geochemical and geological studies to better understand the tectonic evolution of the Madawara region.

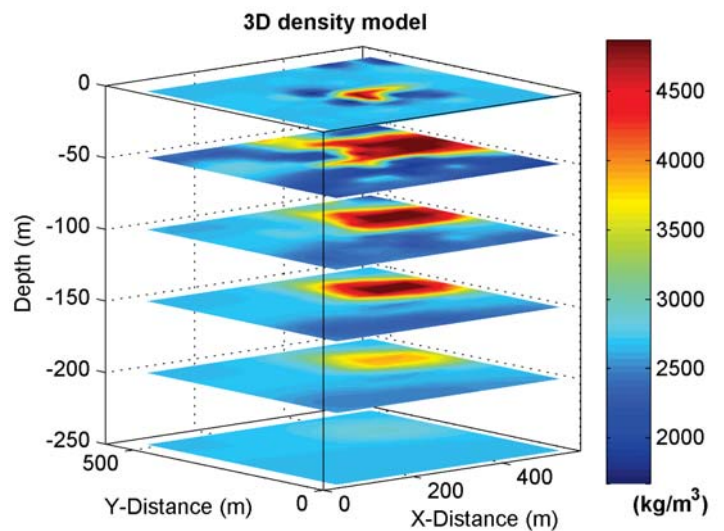


Figure : Subsurface 3D density model depicting the depth extent of high density (>3500 kg/m³) mineralization zones (e.g., chromite ores)

This project will provide partial financial support to buy a digital gravimeter and thus, help to establish one basic facility in geophysics (e.g., digital gravimeter) as required for teaching and research at the department of Earth Sciences.

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Research/Technology/Collaboration in the following link
<http://www.iitk.ac.in/dord/query-form>

Feedback/Suggestions

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