# PhD Project

## Project Details

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<tr>
<th>Role</th>
<th>Faculty</th>
<th>Academic Unit in IITD</th>
<th>Email ID</th>
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<tbody>
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### Project Title

Development of Photocatalytic Semiconducting Nanocomposites and Study on their Efficiency for Degradation of Pharmaceutical Drugs in Wastewater

### Project Summary

Contamination of the surface water bodies by different pharmaceutical residues is a major threat to the human being. Appropriate treatment option is needed to remove them from wastewater before they get discharged to the receiving environment. Conventional water treatment systems are neither designed for nor capable of removing such emerging pollutants. Few advanced treatment processes are capable of removing these pollutants partially but the capex and opex of these treatment systems are the major prohibitive factors for their implementation. Efficient and less expensive treatment system are in dire need to address this issue. Photocatalyst is a kind of agent which gets activated by irradiation of sunlight as well as UV-light and degrades the desired organic pollutants. Photo-catalyst produces hydroxyl radicals which can degrade various organic pollutants including pharmaceutical residues. Over the past few years hybrid nanostructured photocatalysts have been studied in a very focused way and different modifications of the materials are done to improve their photocatalytic efficiency. Various semiconducting nanoparticles are used for the synthesis of photocatalyst like ZnO, TiO₂, WO₃, etc. The aim of the proposed project is to synthesize a series of highly efficient, cost effective, reusable, and recyclable photocatalytic agents consist of novel semiconducting hybrid nanocomposite for complete degradation of pharmaceutical residues present in the real wastewater.

### Project requirements (Student qualifications, experience required, etc.)

- M.Tech in Textile Technology / Chemical Engineering / Biochemical Engineering / Polymer Science / OR MSc in Chemistry with Qualifying NET/GATE
- Applicant with sufficient knowledge in inorganic/organic chemical synthesis and processing AND basics of organometallic heterogeneous and homogenous photocatalyst, wastewater treatment, degradation of pharmaceutical residues will be preferred

### Source of funding (IRD/FITT Project details, if any)

Sponsored project / fellowship from any government (like, valid JRF CSIR-UGC; valid DST-Inspire Fellowship; etc.) or private recognized funding agency.

### Role of Faculty Members involved

The proposed work is truly an interdisciplinary task where the expertise of the collaborators can be complementary. There are clearly two distinct segments of the entire research work. Firstly, the synthesis of photocatalytic semiconductor material based on hybrid nanocomposite where Dr. Wazed Ali from Dept. of Textile and Fibre Engineering would play major role. On the other hand, the developed photocatalysts will be utilized for the degradation of pharmaceutical residues present in the wastewater and their comprehensive studies on catalytic efficiency, their reusability and recyclability would be the key role for Dr. Shaikh Ziauddin Ahammad from the Dept. of Biochemical Engineering and Biotechnology.