

## The University of Queensland - IIT Delhi Academy of Research Joint PhD Project

<b>PROJECT TITLE</b>	<b>DEVELOPMENT OF SUSTAINABLE TECHNOLOGY FOR METAL RECOVERY FROM ELECTRONIC WASTE AND SCALE-UP OF THE DEVELOPED PROCESS</b>
<b>PROJECT CODE</b>	<b>UQIDAR 00201</b>
<b>PROJECT DESCRIPTION</b>	<p>Electronic waste (e-waste) is the fastest growing waste stream with an annual growth rate of about 3â€“5%. E-waste generated in 2016 was 44.7 million tonnes and it is expected to grow to 52.2 million tonnes by 2021. Unregulated accumulation or dumping of e-waste can cause severe health and environmental hazards as it contains toxic substances. Consequently, it is inevitable to find a sustainable solution for the sound management of e-waste and to reduce the harmful effects on human health and the environment. Metals and plastic are the major components of e-waste with a share of 61% and 21% respectively. E-waste contains various heavy (Cu, Ni, Hg, Cd, Pb, etc.) and precious metals (Ag, Au, Pd, Pt). Nevertheless, the presence of these metals may affect the ecosystem due to the lack of adequate management of e-waste. The metal content of e-waste makes it as an alternative resource of metal recovery and overcome the scarcity of metals. It is important to transform the e-waste into wealth by extracting the metal and conserving the resources. The aim of the proposed project is to develop sustainable technology for the recovery of metals from e-waste and scale-up of the process. In this regard, the metal recovery process will be developed under the supervision of Prof. K. K. Pant at IIT Delhi while the economic analysis and the scale-up of the process will be done under the supervision of Prof. Glen Corder at the University of Queensland. The low-temperature roasting process will be employed for the recovery of metals from e-waste. The disposal of e-waste is the major challenge of modern society as the usual approach is to get rid of the e-waste via landfilling and incineration. However, these approaches are not environmentally friendly. It is expected that the successful completion and implementation of this project will help in the sound management of e-waste along with the revenue generation by the recovery of metals.</p>
<b>PROJECT OUTCOMES</b>	<p>The overall outcome would be the development of sustainable technology for the recovery of valuable metals from e-waste. Nevertheless, there would be several direct and indirect deliverables/outcomes of the proposed project. Some of the major outcomes are as follows:</p> <ol style="list-style-type: none"> <li>1. Solving the e-waste problem</li> <li>2. A standard protocol for e-waste characterization</li> <li>3. Selection of process for recovery of valuable metals from e-waste</li> <li>4. Optimization of process parameters for metal recovery</li> <li>5. Technology development for metal recovery</li> <li>6. Techno-economic feasibility study for a scale-up of the developed process</li> <li>7. Design of pilot plant for metal recovery</li> </ol>
<b>ADVISORY TEAM</b>	<p><b>Associate Professor Glen Corder</b> Sustainable Minerals Institute (SMI), UQ <a href="https://smi.uq.edu.au/profile/737/glen-corder">https://smi.uq.edu.au/profile/737/glen-corder</a></p> <p><b>Professor Kamal Pant</b> Chemical Engineering, IITD <a href="http://web.iitd.ac.in/~kkpant/">http://web.iitd.ac.in/~kkpant/</a></p>
<b>TYPE OF STUDENT</b>	Applications are open to <b>i-students</b> <a href="#">who meet eligibility criteria.</a>

DISCIPLINE  
BACKGROUND  
OF STUDENT

Ideally, this project requires students with a background in: 1. Chemical Engineering 2. Chemistry 3. Electrochemistry 4. Metal Recovery

IDEAL  
CANDIDATE

Essential capabilities: Sound knowledge in chemical engineering

Desirable capabilities: Experience in working on MP-AES, ICP, FT-IR, TGA, SEM, TEM

Expected qualifications (courses, degrees, etc): M. Tech/M.S. in Chemical Engineering

APPLICATION  
PROCESS

Apply online by the due date: <https://www.uqidar.org/students/how-to-apply/>