

## **R&D Areas**

### **Air Pollution Control**

- Ambient air quality and fugitive / vehicle emission monitoring
- Source apportionment studies by monitoring and modeling
- Characterization and management of dioxins and furans
- Air quality modeling
- Designing and development of air pollution control systems
- Delineation of air environment management plans
- Carrying capacity based development planning

### **Environmental Biotechnology**

- Environmental genomics
- Genotoxicity based risk analysis
- Product and process development
- Eco-technology
- Cleaner process development
- Restoration and remediation of degraded land

### **Environmental Impact and Risk Assessment**

- Environmental appraisal for suitability and selection of sites for locating industrial projects
- Environmental quality monitoring including assessment of biodiversity for identification of impacts
- Mathematical modeling for predicting and evaluating impacts on air, noise, surface and groundwater, land, biological, coastal and marine environment and parameters of socio-economic interests
- Social and health impact assessment, and preparation of rehabilitation and resettlement plans
- Risk assessment using Maximum Credible Accident (MCA) and Hazard and Operability (HAZOP) analysis
- Risk minimization and mitigation measures, and preparation of emergency preparedness and disaster management plans

### **Environmental Materials**

#### ***Development of materials that are useful in:***

- Cleaner energy production systems
- Vehicular emission control
- Monitoring and control systems for non-conventional pollutants like VOCs, arsenates etc.
- Monitoring and control technologies for hazardous pollutants in water / wastewater

#### ***Material synthesis and characterization***

- Molecular sieves and zeolites
- Surface functionalized zeolites
- Perovskite based catalytic materials
- Multifunctional metals / metal oxide materials
- Photocatalytic materials
- Carbon materials

## **Environmental Systems Design Optimization and Modelling**

- Development and application of numerical models for prediction of environmental quality
- Development and application of Geographical Information System (GIS) and Remote Sensing (RS) based models and analytical tools for natural resources management
- Development and application of environmental systems design, detailed engineering, costing and drawing for the design of water supply, sewerage systems, and water and wastewater treatment systems
- Application of advanced numerical and graphical tools for environmental systems analysis and management

## **Water Technology and Management**

- Surveillance of drinking water quality
- Performance evaluation of water treatment plants
- Development of analytical techniques for water quality assessment
- Monitoring and management of environmental contamination with POPs
- Evaluation of water resources for health related water quality parameters
- Technology development for improvement of water quality: arsenic detection, fluoride removal, iron removal, pesticides and THMs removal
- Eco-restoration of impounded surface water bodies
- Application of non-invasive methods in characterization of water environment
- Assessment of dam construction for irrigation projects - catchment and command areas
- Development of techniques and methodology for exploration, assessment and management of groundwater in hard rock areas
- Assessment of salinity ingress in coastal areas

## **Solid and Hazardous Waste Management**

- Rapid composting technologies
- Waste to energy research projects
- Recycling of waste products
- Green house gas emissions from landfills
- Quantification and characterization of solid wastes from urban centers and industries
- Environmental evaluation of landfill sites
- Eco-toxicological assessments of landfills
- Economic and eco-friendly utilization of solid wastes

## **Wastewater Technology**

- Basic engineering designs for wastewater (ETPs & CETPs)
- Zero-discharge based wastewater treatment technologies
- Physico-chemical conversions
- Bioconversions
- Recycle and reuse
- Development of treatment technologies for color and COD removal from wastewater
- Modeling of wastewater treatment processes
- Removal of dissolved solids and nutrients from wastewater
- Monitoring and removal of volatile organic compounds
- Natural purification systems for wastewater treatment
- Land application of treated wastewater
- Development of adsorbents for heavy metals removal