DR. DIPAK MAITY, ASSISTANT PROFESSOR, DEPARTMENT OF MECHANICAL ENGINEERING RECEIVES NANOMISSION RESEARCH FUNDING FROM DST

8 March 2016 – Dr. Dipak Maity, Assistant Professor, Department of Mechanical Engineering, School of Engineering, has been awarded a multi-year grant of approximately 50 lakh rupees as part of the **Nano Mission r**esearch programme of the **Department of Science and Technology (DST)**, **Government of India**.

Dr. Maity's research project, called "***Multi-Functional Magnetic Nanoparticles for Cancer Theranostic Applications***," focuses on development of a novel magnetic nanoparticulate system to efficiently diagnose and kill – hence the term "Theranostic," that is a system which combines therapy and diagnostics in one package – cancer cells in a site-specific manner.

According to the World Health Organization (WHO), there were an estimated 8.2 million deaths from cancer worldwide in 2012, and more than 14 million new cases of cancer are diagnosed every year. The statistics indicate that the conventional methods of diagnostics and drug delivery are not good enough to treat cancer cells, particularly with the rise of drug-resistant cancers.

Superparamagnetic iron oxide nanoparticles (SPIONs), an example of magnetic nanoparticles, have the potential to be used in cancer theranostics, i.e., simultaneous therapeutics (magnetic hyperthermia) and diagnostics (magnetic resonance imaging - MRI) due to their excellent saturation magnetization and biocompatibility. SPIONs are combined with other drugs/channel blockers/imaging agents to provide a multi-functional approach to efficiently diagnose and kill the drug-resistant cancer cells in a site-specific manner. Apart from the main theranostic applications, SPIONs are also utilized in magnetic targeting, cell labelling, and magnetofection.

Synthesizing high quality SPIONs and preserving their optimal magnetic properties for effective cancer theranostics is a major research problem. Another significant research problem is the incorporation of multiple drugs/theranostic agents in a one-pot nanoparticulate system. Dr. Maity proposes to address both these problems in his work. He notes that "the main goal of this project is to inhibit multi-drug resistance (MDR) in cancer cells by site-targeted drug delivery of a novel magnetic nanoparticulate system by co-encapsulating SPIONs of higher specific absorption rate and MRI relaxivity with calcium channel blockers and chemotherapeutic drugs for performing combined cancer theranostics."