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Name of the Department/Centre	**:** Applied Sciences and Humanities
Topic of Research	**:** Synthesis, Characterization and Applications of Metal-based Nanomaterials

Finding

Metal oxides play a significant role in environmental remediation and energy storage materials. Tuning of nanomaterials could be done by adopting different synthesis processes of nanomaterials. Chemical and green synthesized nanomaterials effectively address the problem of environmental and energy storage materials. Industrialization and globalization pollute the aquatic system and demand more energy-efficient materials. The sustainability and health perspectives of the aquatic environment have made the removal of pollutants from wastewater a matter of utmost concern. This thesis work discusses the fabrication of nanomaterials by using the chemical and green route of synthesis for the application towards pollutant removal from water and energy storage materials. XRD, FTIR, SEM, TEM, UV-vis, BET, and Raman analysis was studied using various characterization techniques. For wastewater treatment photocatalysis process was studied by adopted corresponding various dye degradation under visible and UV light. Parameters such as photocatalyst dose, dye concentration, and irradiation time were optimized using response surface methodology (RSM) based on central composite design (CCD). The dielectric properties were studied using an LCR meter. Antibacterial activity was also assessed for the synthesized nanomaterials against some common pathogens (gram-positive and gram-negative) such as *E. coli*, *P. Aeruginosa*, *S. aureus*, and *B. subtilis*.