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Green-(nano)material optimization and their application in environmental remediation

Green-(nano)materials comprise synthesis of nanomaterials using ingredients of natural origin minimizing impact of the hazardous waste. In this study, different aspects of natural ingredients have been explored. A simple protocol has been developed for preparation of the plant leaves extract (PLE) from five plants (Lingonberry, Tansy, Dandelion, Lady's mantle and Stinging nettle, Finland) and their application to biochemical approach of the metal nanoparticles. Different other plants (Rowan, Rose, Finland) extract concentration, metal ion concentration, temperature and period of contact were investigated in the production of precious metal nanoparticles. PLE-mediated nanoparticles were characterized to confirm the shape, size, crystallinity, and content using spectroscopic investigations, triggering catalytic and disinfection applications via bio-(nano)transformation. Under environmental remediation scheme, the natural ingredients of PLE are not only used in biocatalytic pathways of silver and gold nanoparticles but can also be targeted for carcinogenic Cr(VI) to essential Cr(III) in a variable water chemistry conditions by False spiraea (South Korea). PLE were further explored to synthesize zerodimensional carbon sphere via a single-step hydrothermal carbonization, a relatively new route and applied in successful remediation of the radioactive waste-U(VI). Solid-solution interface chemistry showed the uptake efficiency of plant-derived carbon sphere for U(VI) was higher than that of the chemical-derived (glucose-impacted) carbon sphere. This study demonstrates potential use of PLE as a green catalytic reducer in environmental remediation and in fabrication of material of interest.

Biography

Shashi Prabha Dubey obtained her Ph.D. degree at the age of 26 years from CSIR-IITR and University of Lucknow, India. She is currently Assistant Professor & Head, Department of Chemistry, T.P.S. College, Patliputra University, Patna, Bihar, India. She awarded Marie Curie Experienced Researcher at University of Kuopio, Finland. She worked as a Postdoctoral Researcher and further as a Research Scientist at UNIST, Ulsan, South Korea. She also served as Scientist C & Head, Quality Assurance Laboratory, Biotech Park, Lucknow, India. Her research interest focuses on green-(nano)material fabrication and environmental applications. She has published >29 research papers in scientific journals.