

## Green Nanotechnology Based on Ionic Liquids: Synthesis of Inorganic Nanocrystals, IL/Inorganic Nanohybrids, and CNT Nanocomposites and Their Applications

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The concept of 'green nanotechnology' is of prime importance in terms of reducing impacts on human health and the environment for practical applications. In this work, ionic liquids (ILs) serve as the hierarchical multifunctional material in terms of acting as template and solvent agents in the design and fabrication of functional nanomaterials, assembling and positioning nano-objects, and conducting ions or interacting with target materials in the process of device operation. ILs can "design" various nanomaterials and "function" for applications into electrochemical devices, separation, and photocatalysis. The gallery of nanomaterials fabricated by and/or composed of ILs was inorganic nanocrystals ( $\gamma$ -Al<sub>2</sub>O<sub>3</sub>,  $\alpha$ -Fe<sub>2</sub>O<sub>3</sub>), IL/inorganic nanohybrids (IL/ $\gamma$ -AlOOH, IL/ $\beta$ -FeOOH), and CNT/IL/NP (Pt, Pd, Au, Ag, Sn, Fe, ZnO, CdTe) nanocomposites. Therefore, IL-based green nanotechnology suggested herein opens new pathway toward the design and fabrication of functional nanomaterials and their applications into conventional and emerging technologies.