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Sustainable Nanomaterials

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Green Nanotechnology for Clean Energy and Environmental Sustainability

Sabeeha Jabeen, Tahmeena Khan, Adhish Jaiswal, and Shashi Bala

Abstract Green nanotechnology has emerged as a promising project that aims to integrate nanotechnology principles with environmental sustainability and emerged as a promising alternative for clean energy. In this chapter, the role of green nanotechnology in overcoming the challenges of clean energy provision and environmental sustainability has been discussed. The chapter critically examines and highlights the potential environmental impacts associated with the use of nanomaterials (NPs) and covers different aspects of green nanotechnology in energy production such as solar cells, fuel cells, and electronic devices. The findings suggest that green nanotechnology has great potential to solve energy crises, and may be further explored. The applications of green nanotechnology in the pursuit of environmental sustainability and the role of nanomaterials as catalysts in environmental remediation processes to remove pollutants from the air and water have also been included. The green fabricated nanomaterials can break down pollutants into harmless products or facilitate their removal by adsorption. Nanotechnology-based sensors are also used to monitor the environment in real time and help detect and reduce pollution. The adoption of green nanotechnology is effective in reducing energy consumption, increasing resource efficiency, and reducing environmental impact. Regulatory and responsible design processes are essential to protect human health and the environment throughout the lifecycle of nanotechnology products.

Keywords Green nanotechnology · Clean energy · Environmental sustainability · Wastewater remediation · Solar energy

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