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(51) International classification	:C01F 7/02, B82B 3/00, A61K 33/06, C01F 7/441, C01F 7/30	(71) <b>Name of Applicant :</b> <b>1)Swami Rama Himalayan University</b> Address of Applicant :Swami Rama Himalayan University, Swami Ram Nagar, Jolly Grant, Dehradun-248016 Dehradun Uttarakhand India (72) <b>Name of Inventor :</b> <b>1)Ayushi Santhanam</b> <b>2)Archna Dhasmana</b>
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(57) Abstract :

The present invention discloses a green and sustainable process for the synthesis of biogenic aluminum oxide nanoparticles through the utilization of recycled aluminum waste and agro-biomass-derived phytoextracts. In the disclosed method, aluminum waste is digested in an aqueous phytoextract under controlled thermal conditions, wherein the phytoextract acts as a natural reducing, stabilizing, and surface-capping agent, eliminating the need for hazardous chemicals. The process results in the formation of nanoscale aluminum oxide nanoparticles with controlled morphology and enhanced stability. The synthesized nanoparticles exhibit intrinsic biological activities, including anti-inflammatory, antioxidant, and antimicrobial effects, attributable to phytochemical surface functionalization. The invention provides a cost-effective and environmentally benign approach for converting waste materials into high-value nanomaterials, making the biogenic aluminum oxide nanoparticles suitable for biomedical, industrial, and sustainable material applications.

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