

Detoxification of Hazardous Organic/Inorganic Contaminants in Automobile Shredder Residue by Multi-Functioned Nano-Size Metallic Calcium Composite

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Abstract : In recent years, environmental nanotechnology has risen to the forefront and the new properties and enhanced reactivities offered by nanomaterial may offer a new, low-cost paradigm to solving complex environmental pollution problems. This study assessed the synthesis and application of multi-functioned nano-size metallic calcium (nMC) composite for detoxification of hazardous inorganic (heavy metals (HMs)/organic chlorinated/brominated compound (CBCs) contaminants in automobile shredder residue (ASR). ASR residues ball milled with nMC composite can achieve about 90-100% of HMs immobilization and CBCs decomposition. The results highlight the low quantity of HMs leached from ASR residues after treatment with nMC, which was found to be lower than the standard regulatory limit for hazardous waste landfills. The use of nMC composite in a mechanochemical process to treat hazardous ASR (dry conditions) is a simple and innovative approach to remediate hazardous inorganic/organic cross-contaminates in ASR.

Keywords : nano-sized metallic calcium, automobile shredder residue, organic/inorganic contaminants, immobilization, detoxification

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