Novel Anti-Radiation Polypropylene-Eggshell Composite

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Worldwide consumption of hen eggs is quite high, hence giving the eggshell as a large amount of discarded waste. The utilization of waste may bring this eggshell into high-added value since eggshell emerges as non-toxic, versatile and known as an efficient adsorbent for the removal of hazardous chemicals. Novel composite material containing recycled commercial polypropylene (PP) and extracted calcium from eggshell (ES) was prepared and applied as anti-radiation material. The PP/ES composite was prepared by mixing milled PP and milled ES based on German Equation. The pressing device with 0.2 MPa for 15 min was used to prepare the composite, after that sintering the composite at 150 °C for 1 h. Prior to mixing, calcium was extracted from eggshell by calcining at 800 °C for 1 h. Subsequently, PP in the form of pellet and ES was milled by using planetary ball milling, respectively. This novel composite was characterized by X-Ray Powder Diffraction (XRD) and Scanning Electron Microscopy – Energy Dispersive X-Ray Analysis (SEM-EDX) to determine structural and morphological properties, respectively. The material was exposed to gamma-ray obtained from Cs-137 source. The radiation properties were quantitatively detected by using Geiger counter instrument. Polypropylene filled with extracted calcium from eggshell waste exhibits good shielding properties for gamma rays of energy 0.662 MeV. This novel composite material is proposed to be a low cost and additionally supporting the waste conversion into useful product. Keywords : Anti-Radiation, Eggshell, Waste, Polypropylene

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