



Contribution ID: 235

Type: POSTER

The Use of Graphene Quantum Dots for Liquid Radioactive Waste: Immobilization and Volume Reduction

The use of new materials, especially based on carbon nanomaterials is increasing each day. Among these carbon-based nanomaterials, graphene quantum dots are one of the most impressive ones, not only by its quantum behavior but due to the adsorption quality conferred by electrostatic interactions from the negatively charged groups as the huge surface area (2.630 m²/g). In this study, we developed and tested graphene quantum dots (GQDs) as smart nano-adsorbents of uranium (²³⁸U) from the radioactive industry waste. The GQDs were developed in a size range of 160-220 nm using a totally green route. The results showed that the GQDs were capable to adsorb almost 60% of the uranium (²³⁸U) complex solutions. Also, the results demonstrated a volume reduction of almost 90%, helping the storage process as the final disposal of this material.

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Track Classification: Track 5 - Practical experiences in integrating safety and sustainable development