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Nanotechnology for Radioactive Waste: The use of graophene derivatives for the treatment of liquid radioactive wastes

The use of smart materials, especially the carbon-based nanomaterials is increasing each day. Among the several carbon-based nanomaterials, graphene quantum dots are one of the most impressive one, not only by its quantum behavior but due 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 160-220nm using a totally green route. The results showed that the GQDs were capable to adsorb almost 60% of the uranium (²³⁸U) in alamine 3366 solution. Also the results demonstrated that using GQDs treatment-like smart-nanomaterials for radioactive waste a volume reduction of almost 80% is achieved, helping the storage process as the final disposal of this material. We may conclude that GQDs may represent a smart-device for the treatment of radioactive waste as an alternative of absorbent in the radioactive industry.

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