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Highly porous and stable metal–organic frameworks for uranium extraction

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Transformative technologies are needed in order to achieve economic uranium extraction from waste to generate a new fuel or for a safe storage. Metal–organic frameworks (MOFs) are a class of hybrid materials composed of organic bridging ligands coordinated to metal ions or metal ion clusters. The result is the formation of a porous crystalline solid that possess adequate stability in aqueous solution for potential application in U extraction. These materials can selectively precipitate with a specific metal to extract it or they have large pore apertures to facilitate the transport of hydrated actinide
ions through the interior of the frameworks for the extraction. In this way pollutants such as actinides can be targeted for selective precipitation as a MOF or bind inside the framework by the ligand. This material can be easily recovered by simple filtration or centrifugation and actinide can be stored after a thermal treatment of the material to finally generate an original strategy to combine extraction and storage.

Summary

We propose here an original way with the use of coordination polymers (MOFs) for the uranium extraction to generate new fuel or for the storage.

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