

## Accepted Manuscript

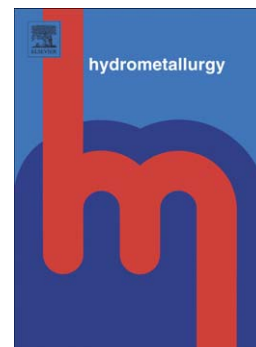
Chemical modifications of chitosan nano-based magnetic particles for enhanced uranyl sorption

Ahmed A. Galhoum, Mohammad G. Mahfouz, Nabawia M. Gomaa, Thierry Vincent, Eric Guibal

PII: S0304-386X(16)30588-6  
DOI: doi: [10.1016/j.hydromet.2016.08.011](https://doi.org/10.1016/j.hydromet.2016.08.011)  
Reference: HYDROM 4424

To appear in: *Hydrometallurgy*

Received date: 4 February 2016  
Revised date: 12 July 2016  
Accepted date: 25 August 2016



Please cite this article as: Galhoum, Ahmed A., Mahfouz, Mohammad G., Gomaa, Nabawia M., Vincent, Thierry, Guibal, Eric, Chemical modifications of chitosan nano-based magnetic particles for enhanced uranyl sorption, *Hydrometallurgy* (2016), doi: [10.1016/j.hydromet.2016.08.011](https://doi.org/10.1016/j.hydromet.2016.08.011)

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

**Chemical modifications of chitosan nano-based magnetic particles for enhanced uranyl sorption** Ahmed A. GALHOUM,<sup>a,b</sup> Mohammad G. MAHFOUZ,<sup>a</sup> Nabawia M. GOMAA,<sup>a</sup> Thierry VINCENT,<sup>b</sup> and Eric GUIBAL<sup>b,\*</sup>

<sup>a</sup>Nuclear Materials Authority, P.O. Box 530 Maadi, 11381 Cairo, Egypt

<sup>b</sup>Ecole des mines d'Alès, Centre des Matériaux des Mines d'Alès, 6 avenue de Clavières, F-30319 Alès cedex, France

galhoum\_nma@yahoo.com, mahfouzma@yahoo.com, g\_nabawia@hotmail.com, thierry.vincent@mines-ales.fr, eric.guibal@mines-ales.fr

Abstract

The grafting of diethylenetriamine (preferentially to the grafting of serine > cysteine > alanine) onto chitosan (immobilized on magnetic nano-based particles by combined polymer precipitation and hydrothermal treatment) allows synthesizing an efficient sorbent for uranyl at pH 4 (maximum sorption capacity close to 185 mg U g<sup>-1</sup>). Sorption isotherm (regardless of the sorbent) is fitted by the Langmuir equation, while uptake kinetics is well described by the pseudo-second order rate equation. The design of nano-based particles (10-50 nm) allows reducing the impact of resistance to intraparticle diffusion on uptake kinetics and the equilibrium contact time is close to 45-60 min. The super paramagnetic properties of the hybrid materials make their solid/liquid separation quite easy using an external magnetic field. Finally uranyl ions can be desorbed using acidic urea solution (0.5 M, pH > 2) and the sorbents can be recycled for at least 5/6 cycles with a limited loss of sorption capacity (less than 9 %).

Keywords: chitosan; magnetic nano-based particles; amino-acid grafting; diethylene triamine; uranyl; sorption isotherm; uptake kinetics; metal desorption; sorbent recycling.

Download English Version:

<https://daneshyari.com/en/article/4769091>

Download Persian Version:

<https://daneshyari.com/article/4769091>

[Daneshyari.com](https://daneshyari.com)