

Accepted Manuscript

Removal of fluoride from drinking water using highly efficient nano-adsorbent, Al(III)-Fe(III)-La(III) trimetallic oxide prepared by chemical route

Mrinal K. Adak, Asmita Sen, Shrabanee Sen, Debasis Dhak



PII: S0925-8388(17)31741-3

DOI: [10.1016/j.jallcom.2017.05.149](https://doi.org/10.1016/j.jallcom.2017.05.149)

Reference: JALCOM 41879

To appear in: *Journal of Alloys and Compounds*

Received Date: 31 March 2017

Accepted Date: 14 May 2017

Please cite this article as: M.K. Adak, A. Sen, S. Sen, D. Dhak, Removal of fluoride from drinking water using highly efficient nano-adsorbent, Al(III)-Fe(III)-La(III) trimetallic oxide prepared by chemical route, *Journal of Alloys and Compounds* (2017), doi: 10.1016/j.jallcom.2017.05.149.

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.

Removal of Fluoride From Drinking Water Using Highly Efficient Nano-adsorbent, Al(III)-Fe(III)-La(III) Trimetallic Oxide Prepared by Chemical Route

Mrinal K Adak,¹ Asmita Sen,¹ Shrabanee Sen,² Debasis Dhak^{1*}

¹Department of Chemistry, Sidho-Kanho-Birsha University, Purulia-723104, WB, India.

²Piezo-Ceramic Division, Central Glass and Ceramics Research Institute, Kolkata, WB, India

Nanocrystalline Al(III)-Fe(III)-La(III) trimetallic oxide was synthesized through chemical process. XRD revealed monoclinic phase when calcined at 800°C, 4h. IR study confirmed the formation of desired compound. A high surface area of 22.14 m²/g was observed with a pore volume 1.5x10⁻² cc/g. The porosity and the microstructure were studied by SEM and TEM. F⁻ adsorption capacity was studied varying the adsorbent dose in 100 ml: 0.05 g, 0.1g, 0.2g and 0.3g and the contact time in minute: 15, 30, 45 and 60 taking 3 ppm, 5 ppm and 10 ppm fluoride solutions. Experimental observation revealed high fluoride adsorption capacity ~ 99%.

Keywords: Drinking water; Fluoride Removal; Nano-adsorbent; Chemical synthesis.

1. Introduction

In recent years a variety of cost effective natural, modified and synthetic solid adsorbents were designed for the removal of fluoride from drinking water and waste water. Many different materials such as Fe-impregnated chitosan [1], alum impregnated activated alumina [2], MnO₂ modified earthenware [3], Alumina modified iron oxide [4], Mg doped ferrihydrite [5] etc.

Effective removal of fluoride can be made by using methods like Nalgonda process [6], Contact precipitation process [7], electrode deposition process [8], adsorption [9] etc. However, due to high cost, extreme pH and large dosage, it was not practicable for field application. Besides that most of the adsorbents exhibit the fluoride removal capacity not greater than 2 mg/L, therefore, they were not appropriate for the drinking water treatment purpose, especially as some of them could only

* Corresponding author, E-mail: debasisdhak@yahoo.co.in

Download English Version:

<https://daneshyari.com/en/article/5458971>

Download Persian Version:

<https://daneshyari.com/article/5458971>

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