

## Accepted Manuscript

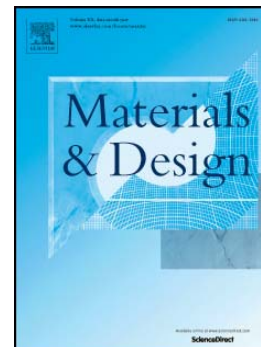
Copper foams in water treatment technology: removal of hexavalent chromium

F. Stergioudi, E. Kaprara, K. Simeonidis, D. Sagris, M. Mitrakas, G. Vourlias, N. Michailidis

PII: S0264-1275(15)30271-9  
DOI: doi: [10.1016/j.matdes.2015.08.022](https://doi.org/10.1016/j.matdes.2015.08.022)  
Reference: JMADE 430

To appear in:

Received date: 23 February 2015  
Revised date: 2 August 2015  
Accepted date: 4 August 2015



Please cite this article as: F. Stergioudi, E. Kaprara, K. Simeonidis, D. Sagris, M. Mitrakas, G. Vourlias, N. Michailidis, Copper foams in water treatment technology: removal of hexavalent chromium, (2015), doi: [10.1016/j.matdes.2015.08.022](https://doi.org/10.1016/j.matdes.2015.08.022)

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.

## Copper foams in water treatment technology: removal of hexavalent chromium

F. Stergioudi<sup>1</sup>, E. Kaprara<sup>2</sup>, K. Simeonidis<sup>3</sup>, D. Sagris<sup>4</sup>, M. Mitrakas<sup>2</sup>, G. Vourlias<sup>5</sup>, N. Michailidis<sup>1\*</sup>

<sup>1</sup>Physical Metallurgy Laboratory (PML), Mechanical Engineering Department, Aristotle University of Thessaloniki, 54124 Thessaloniki, Greece

<sup>2</sup>Department of Chemical Engineering, Aristotle University of Thessaloniki, Thessaloniki 54124, Greece

<sup>3</sup>Department of Mechanical Engineering, School of Engineering, University of Thessaly, Volos 38334, Greece

<sup>4</sup>Department of Mechanical Engineering, Technological Education Institute of Serres, Greece

<sup>5</sup>Physics Department, Aristotle University of Thessaloniki, 54124 Thessaloniki, Greece

### Abstract

Open-cell copper foams were prepared using a space holder technique and tested as filter-beds for the uptake and reduction of Cr(VI) in drinking water. The use of raw cane sugar as a space holder provides an environmentally friendly method for the production of foams with controllable porous network characteristics. Specifically, by applying a sugar volume of 70-80 % with particle sizes in the range of 0.35-0.70 mm, it was possible to obtain final porosity of 65 %, high structural stability, and enhanced interconnectivity of macropores required for the free flow of treated water. Smaller sugar particles ensure a smaller pore size and a higher specific surface area, favoring the interaction of water with the effective copper surface. Column tests indicated that a realistic filtering system using the Cu-foam can operate with complete Cr(VI) removal and minimum Cu leaching in the pH 7±0.2 range, capturing chromium in the form of Cr(III) and Cr(VI) oxides. Chromium is homogeneously distributed and incorporated into the copper porous network allowing an almost unlimited lifetime of effective use compared to common adsorbents.

**Keywords:** copper foams, hexavalent chromium, drinking water, XPS, X-ray tomography

Download English Version:

<https://daneshyari.com/en/article/7220019>

Download Persian Version:

<https://daneshyari.com/article/7220019>

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