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Title: The Optimum Condition for the Synthesis of Carbon Nanofibers on Activated Carbon to Remove Lead from Aqueous Solution

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Source: INTERNATIONAL JOURNAL OF NANOELECTRONICS AND MATERIALS **Volume:** 12 **Issue:** 2 **Pages:** 135-143 **Published:** APR 2019

Times Cited in Web of Science Core Collection: 0

Total Times Cited: 0

Usage Count (Last 180 days): 0

Usage Count (Since 2013): 0

Cited Reference Count: 34

Abstract: Optimum process condition for the production of Carbon Nanofibers (CNFs) to remove lead ion (Pb) from aqueous solution is reported here. The CNFs were produced on the catalyst (Ni2+) impregnated palm oil- based cheap Powder Activated Carbon (PAC). Locally fabricated Chemical Vapour Deposition (CVD) system was used while acetylene (C2H2) was the carbon source. The porous nano-composite product is named " PAC- CNFs", which was synthesized through a process using impregnated oil palm shell based PAC as a solid substrate. Design Expert 6.0.8 software was used to design the experimental plan and to determine the optimized process parameters for the growth of CNFs by using sorption capacity for Pb2+ by the PAC-CNFs adsorbent, as a response. The effect of different factors on the growth of CNFs including the temperature of CNFs growth (550 to 750 degrees C), time of growth (30 to 60 min), and the ratio of input C2H2/H-2 gases (0.25 to 1.0) was evaluated. The predicted values for the sorption capacity of Pb2+ by the PAC-CNFs were in close agreement with the experimental data (R-2 = 0.99). The optimal process condition: temperature for the growth of CNFs, time, and C2H2/H-2 ratio was determined as 637 degrees C, 30 min, and 1.0, respectively. The CNFs grown under the optimized condition exhibited sorption capacity of 77 mg/g in removing Pb2+ from synthetic wastewater containing lead (Pb2+) ion.

Accession Number: WOS:000463784600002

Language: English

Document Type: Article

Author Keywords: Carbon Nanofibers; Powder Activated Carbon; Sorption; Water Remediation

KeyWords Plus: WASTE-WATER; OPERATING-CONDITIONS; HEAVY-METALS; ADSORPTION; IONS; NICKEL; PB; DECONTAMINATION; BIOSORPTION; NANOTUBES

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Publisher: UNIMAP PRESS

Publisher Address: 1ST FLR BANGUNAN KWSP, JALAN BUKIT LAGI, KANGAR, PERLIS, 01000, MALAYSIA

Web of Science Categories: Materials Science, Multidisciplinary

Research Areas: Materials Science

IDS Number: HS3TE

ISSN: 1985-5761

eISSN: 2232-1535

29-char Source Abbrev.: INT J NANOELECTRON M

ISO Source Abbrev.: Int. J. Nanoelectron. Mater.

Source Item Page Count: 9

Funding:

Funding Agency	Grant Number
Ministry of Higher Education (MOHE) of the Government of Malaysia	FRGS 0106-42

The authors would like to express their gratitude to The Ministry of Higher Education (MOHE) of the Government of Malaysia for funding this project (Fundamental Research Grant Scheme with grant No. FRGS 0106-42).

Output Date: 2019-08-01

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