

Accepted Manuscript

Fluidized bed chemical vapor deposition of copper nanoparticles on multi-walled carbon nanotubes

Pierre Lassègue, Laure Noé, Marc Monthieux, Brigitte Caussat



PII: S0257-8972(17)31087-3
DOI: doi:[10.1016/j.surfcoat.2017.10.046](https://doi.org/10.1016/j.surfcoat.2017.10.046)
Reference: SCT 22811
To appear in: *Surface & Coatings Technology*
Received date: 4 May 2017
Revised date: 3 October 2017
Accepted date: 15 October 2017

Please cite this article as: Pierre Lassègue, Laure Noé, Marc Monthieux, Brigitte Caussat , Fluidized bed chemical vapor deposition of copper nanoparticles on multi-walled carbon nanotubes. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Sct(2017), doi:[10.1016/j.surfcoat.2017.10.046](https://doi.org/10.1016/j.surfcoat.2017.10.046)

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.

**Fluidized bed chemical vapor deposition of copper nanoparticles
on multi-walled carbon nanotubes**

Pierre Lassègue^a, Laure Noé^b, Marc Monthieux^b, Brigitte Caussat^{a,*}

^aLaboratoire de Génie Chimique, Université de Toulouse, CNRS, INPT, UPS, Toulouse,
France

^bCentre d'Elaboration des Matériaux et d'Etudes Structurales, CNRS, Toulouse, France

(* Phone number: +33 5.34.32.36.32 – E-mail: brigitte.caussat@ensiacet.fr)

Abstract

Multi-walled carbon nanotubes tangled in easy-to-fluidize porous balls have been decorated by pure copper nanoparticles using a pre-industrial fluidized bed chemical vapor deposition process. Copper (II) acetylacetonate $\text{Cu}(\text{acac})_2$ was used as precursor. The low precursor volatility led to low deposition rates, responsible for a non-uniformity of the deposit both on the MWCNT balls and from the outer part to the center of the balls. An oxidative pre-treatment of the MWCNTs allowed to increase slightly the deposit weight and uniformity, by creating new nucleation sites on the nanotube surface. It also allowed decreasing the size of Cu nanoparticles by a factor of ten. A decrease of the deposition temperature increased more markedly the deposit weight, by probably favoring the formation of gaseous reactive intermediate species more reactive on the oxidized nanotube surface. A more efficient precursor delivery system would allow reaching higher deposition rates and much more uniform deposits, making possible an industrial production of metallized carbon nanotubes.

Keywords: CVD – Fluidized bed – Multi-walled carbon nanotubes - Copper – Nanoparticles - Copper acetylacetonate

Download English Version:

<https://daneshyari.com/en/article/8024742>

Download Persian Version:

<https://daneshyari.com/article/8024742>

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