### Accepted Manuscript

Producing carbon nanotubes from thermochemical conversion of waste plastics using Ni/ceramic based catalyst

Xiaotong Liu, Boxiong Shen, Zhentao Wu, Christopher M. A. Parlett, Zhenan Han, Adwek George, Peng Yuan, Dipesh Patel, Chunfei Wu

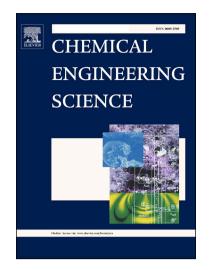
PII: S0009-2509(18)30542-6

DOI: https://doi.org/10.1016/j.ces.2018.07.047

Reference: CES 14401

To appear in: Chemical Engineering Science

Received Date: 4 February 2018 Revised Date: 16 July 2018 Accepted Date: 19 July 2018



Please cite this article as: X. Liu, B. Shen, Z. Wu, C. M. A. Parlett, Z. Han, A. George, P. Yuan, D. Patel, C. Wu, Producing carbon nanotubes from thermochemical conversion of waste plastics using Ni/ceramic based catalyst, *Chemical Engineering Science* (2018), doi: https://doi.org/10.1016/j.ces.2018.07.047

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.

## **ACCEPTED MANUSCRIPT**

# Producing carbon nanotubes from thermochemical conversion of waste plastics using Ni/ceramic based catalyst

Xiaotong Liu<sup>a</sup>, Boxiong Shen<sup>b\*</sup>, Zhentao Wu<sup>c\*</sup>, Christopher M. A. Parlett<sup>d\*</sup>, Zhenan Han<sup>e</sup>, Adwek George<sup>b</sup>, Peng Yuan<sup>b</sup>, Dipesh Patel<sup>a</sup>, Chunfei Wu<sup>a,b,f\*</sup>

- <sup>a</sup> School of Engineering and Computer Science, Faculty of Science and Engineering, University of Hull, Hull, HU6 7RX
- <sup>b</sup> School of Energy and Environmental Engineering, Hebei University of Technology, Tianjin, China
- <sup>c</sup> Aston Institute of Materials Research, School of Engineering and Applied Science, Aston University, Birmingham B4 7ET, UK
- <sup>d</sup> European Bioenergy Research Institute, Aston University, Birmingham, B4 7ET, UK
  <sup>e</sup> Wuhan Optics Valley Environmental Technology Co., Ltd, Wuhan City, China
  430074
- f School of Chemistry and Chemical Engineering, Queen's University Belfast, Belfast, BT7 1NN, UK

Corresponding authors: Tel: +44 (0) 1482466464, Email: c.wu@hull.ac.uk; Tel: +86 (0) 2260435784, E-mail: shenbx@hebut.edu.cn; Tel: +44 (0) 121204 3353, Email: z.wu7@aston.ac.uk; Tel: +44 (0)1212 044100 c.parlett@aston.ac.uk)

#### **Abstract**

As the amount of waste plastic increases, thermo-chemical conversion of plastics provides an economic flexible and environmental friendly method to manage recycled plastics, and generate valuable materials, such as carbon nanotubes (CNTs). The choice of catalysts and reaction parameters are critical to improving the quantity and quality of CNTs production. In this study, a ceramic membrane catalyst (Ni/Al<sub>2</sub>O<sub>3</sub>) was studied to control the CNTs growth, with reaction parameters, including catalytic temperature and Ni content investigated. A fixed two-stage reactor was used for thermal pyrolysis of plastic waste, with the resulting CNTs characterized by various techniques including scanning electronic microscopy (SEM), transmitted electronic microscopy (TEM), temperature programmed oxidation (TPO), and X-ray diffraction (XRD). It is observed that different loadings of Ni resulted in the formation of metal particles with various sizes, which in turn governs CNTs production with varying degrees of quantity and quality, with an optimal catalytic temperature at 700 °C.

Keywords: Plastics waste; Carbon nanotubes; ceramic membrane; Nickel; catalyst

#### Download English Version:

# https://daneshyari.com/en/article/11000263

Download Persian Version:

https://daneshyari.com/article/11000263

<u>Daneshyari.com</u>