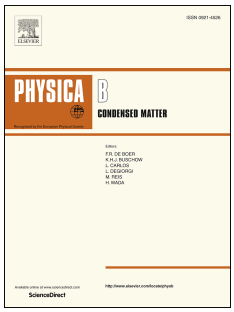
Accepted Manuscript



MWCNT for ambient urea synthesis

Noorhana Yahya, Zia Ur Rehman, A'fza Shafie, Bilal al Qasem, Hassan Soleimani, Muhammad Irfan, Saima Qureshi

PII: S0921-4526(18)30169-8

DOI: 10.1016/j.physb.2018.03.005

Reference: PHYSB 310766

To appear in: *Physica B: Physics of Condensed Matter*

Received Date: 4 November 2017

Revised Date: 8 February 2018

Accepted Date: 5 March 2018

Please cite this article as: N. Yahya, Z.U. Rehman, A'. Shafie, B.a. Qasem, H. Soleimani, M. Irfan, S. Qureshi, MWCNT for ambient urea synthesis, *Physica B: Physics of Condensed Matter* (2018), doi: 10.1016/j.physb.2018.03.005.

MWCNT for Ambient Urea Synthesis

Noorhana Yahya[a,*], Zia Ur Rehman[a,*], A'fza Shafie[a], Bilal al Qasem[a], Hassan Soleimani[a], Muhammad Irfan[a], Saima Qureshi[a]

[a]*Department of Fundamental and Applied Sciences, Universiti Teknologi PETRONAS, 32610, Perak, Malaysia*

Elsevier use only: Received date here; revised date here; accepted date here

Abstract

Entangled multiwall carbon nanotubes have been synthesized by means of the floating catalyst technique for ambient urea synthesis. MWCNT were prepared by the spray pyrolysis of ferrocene ethanol mixture at a temperature of 1200ºC and atmospheric pressure in the presence of N_2 as carrier gas. The X-ray diffraction graph reveals the establishment of hexagonal structure of MWCNT. FE-SEM results show the formation of carbon nanotubes (CNT) with diameter ranging between 26-65 nm. The VSM hysteresis loops depicts that the saturation magnetization values for MWCNT were 1.03 emu/g because of high purity of CNT (99.5%). The nanotubes were used as catalyst for ambient urea synthesis at ambient conditions in the presence of unidirectional constant magnetic field. The use of lower flow rate (for better adsorption) and reaction time (to stop reverse reaction) with high magnetic field gives an increased yield of urea because of enhanced triplet harvesting (Zeeman splitting). The peak yield of urea, 10118 ppm was accomplished by applying 1.25 T of magnetic field and using 0.25 L/min flow rate for a reaction time of 1 minute.

* Corresponding authors.
E-mail: Zia545@hotmail.com (Zia Ur Rehman),
noorhana_yahya@utp.edu.my (Noorhana Yahya).
Postal address: Block-20, Level-3,
Department of Fundamental and Applied Sciences, Universiti Teknologi PETRONAS, 32610, Perak, Malaysia
Phone: +60122176094, +60149705904