

Author's Accepted Manuscript

Pulsed laser ablation synthesis of carbon nanoparticles in vacuum

Fatemeh Kazemizadeh, Rasoul Malekfar, Parviz Parvin



PII: S0022-3697(16)30953-2
DOI: <http://dx.doi.org/10.1016/j.jpcs.2017.01.015>
Reference: PCS7967

To appear in: *Journal of Physical and Chemistry of Solids*

Received date: 22 October 2016
Revised date: 22 December 2016
Accepted date: 15 January 2017

Cite this article as: Fatemeh Kazemizadeh, Rasoul Malekfar and Parviz Parviz Pulsed laser ablation synthesis of carbon nanoparticles in vacuum, *Journal of Physical and Chemistry of Solids*, <http://dx.doi.org/10.1016/j.jpcs.2017.01.015>

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 galley proof before it is published in its final citable 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

Pulsed laser ablation synthesis of carbon nanoparticles in vacuum

Fatemeh Kazemizadeh¹, Rasoul Malekfar^{1*} and Parviz Parvin²

¹Department of Physics, Tarbiat Modares University, P.O. Box 14115-175, Tehran, I.R. Iran.

²Department of Physics, Amirkabir University of Technology, P.O. Box 15875-4413, Tehran, I.R.

Iran.

*Corresponding author. malekfar@modares.ac.ir

Abstract

Crystalline carbon nanoparticles (CNPs) with narrow size distribution were synthesized by pulsed laser ablation (PLA) of graphite in vacuum under a slow flow of argon gas. Transmission electron microscopy (TEM) images indicate the formation of interconnected carbon particles that exhibit a graphitic nanostructure in X-ray powder diffraction (XRD) characterization. Photoluminescence (PL) was observed after acid treatment and surface passivation on synthesized CNPs. PL spectra indicated the existence of narrow size distribution of particles that is confirmed by TEM image, XRD pattern and Raman spectroscopy. Moreover, TEM image, Raman spectra and XRD patterns of surface passivated CNPs show that raw CNPs in an interconnected structure are fragmented into distinct particles that leads to surface to volume ratio increase and photoluminescence enhancement. Fourier transform infrared (FTIR) spectroscopy revealed that in addition to the size confinement, the surface modification of CNPs by carboxylate and methyl groups after surface passivation is also a reason for photoluminescence.

Keywords: Carbon nanoparticle; laser ablation; surface passivation; nanostructure; photoluminescence.

1. Introduction

Recently, carbon nanoparticles (CNPs) have attracted an intense attention for their prominent properties. This new class of carbon-based nanostructures is nontoxic, biocompatible, physicochemically and photochemically stable, high aqueous soluble, and shows strong, size

Download English Version:

<https://daneshyari.com/en/article/5447468>

Download Persian Version:

<https://daneshyari.com/article/5447468>

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