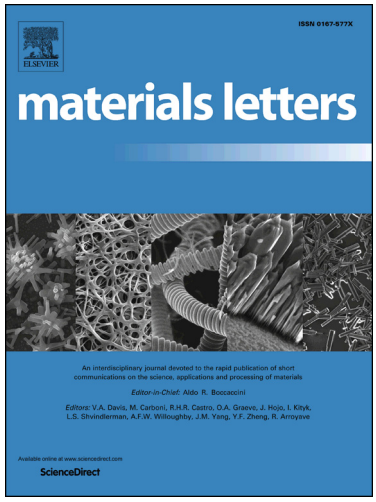

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Plasma enhanced chemical vapour deposition growth and physical properties of single-walled carbon nanotubes

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Abstract

Present work focuses on the growth of single-walled carbon nanotubes (SWCNTs) using nickel as a catalyst onto the silicon substrate through plasma enhanced chemical vapour deposition (PECVD) method. As synthesised SWCNTs have been characterized by employing various analytical techniques like SEM, HR-TEM/EDS and UV-visible absorption spectroscopy. The HRTEM micrographs revealed that the SWCNTs were mostly entangled bundles with diameters of about 1 nm. The optical absorption data were used to estimate energy bandgap of the SWCNTs and found to be 2.67 eV. The photocatalyst performance of the nanotubes was examined by the deterioration of the organic dye methylene blue (MB) under visible light irradiation. The observed results exhibit excellent photocatalytic activity of the nanotubes that may be due to the large surface defects, surface area and small energy band gap characteristics of the nanotubes.

Keywords: Single walled carbon nanotubes; PECVD; Electron microscopy; Photocatalytic activity.

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Introduction

In recent years, SWCNTs have given much attention owing to their unique physical, chemical, mechanical and catalytic properties that make them suitable candidate for various applications including single electron transistors and field effect transistors. Since SWCNTs are one dimensional nanostructure with high surface area and electrical conductivity, they can be used as