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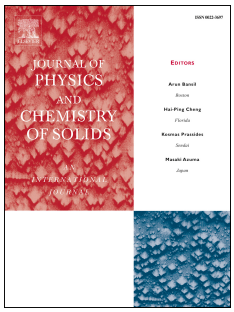

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Field emission properties of a DWCNT bundle and a single MWCNT

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Abstract

The field emission properties of a bundle of double-walled carbon nanotubes (DWCNTs) and a single multiwalled carbon nanotube (MWCNT) were investigated. A DWCNT bundle or a single MWCNT was attached to the head of sharpened tip of tungsten by electrophoresis; the tungsten tip was dipped into a drop of a carbon nanotube/1,2-dichloroethane suspension on a stainless steel plate, and a high-frequency AC voltage (20 V peak to peak with a frequency of 15 MHz) was applied between the tungsten tip and the stainless steel plate. The turn-on fields of the DWCNT and MWCNT tips for 1 nA/cm^2 were 0.05 and 0.48 V/μm, respectively. From the Fowler-Nordheim plots, the field enhancement factor (β) of the tips was estimated to be 109,600 (DWCNT) and 6,780 (MWCNT). The present DWCNT emitter is characterized by a very small turn-on field and large β. The field emission performance is discussed in terms of the sizes of the bundle of DWCNTs and a single MWCNT.

1 Introduction

Carbon materials have attracted attention for a long time because of their characteristic