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## Synthesis of Multilayered Carbon Fiber Arrays and Their Growth Mechanism

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**Abstract:** Multilayered carbon fiber arrays (MLCFAs) were synthesized by thermal chemical vapor deposition (CVD) without growth substrate, in which plate-like basic copper nitrate was used as catalyst precursor, acetylene and hydrogen as carbon source and heat treatment gas, respectively. The formation of multilayered structure of the product has a close relation to the special thermal decomposition characterization of basic copper nitrate. The growth schematic of MLCFAs was established to elaborate their growth mechanism.

Keywords: Carbon materials; Carbon fiber array; Multi layered; Chemical vapor deposition

### 1. Introduction

One-dimensional carbon material array, including carbon fiber array and carbon nanotube array, is an important research subject, which has superior properties (i.e., radiative, electrical, mechanical and other properties) and wide applications [1-6]. Great efforts have been devoted to synthesizing carbon fiber arrays or carbon nanotube (CNT) arrays with large-scale, which can provide a platform for further investigation and applications. Generally, the introduction of a growth substrate is necessary for the synthesis of carbon fiber/carbon nanotube arrays. D. Mattia et al. [7] have

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