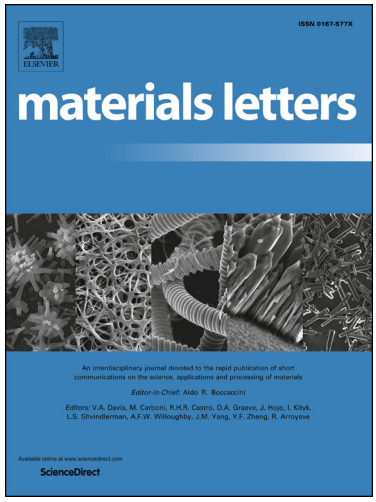

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A novel and green fabrication of 3C-SiC nanowires from coked rice husk-silicon mixture and their photoluminescence property

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Abstract

This work provides a novel and green approach to synthesize 3C-SiC nanowires (NWs) by carbothermic reduction of coked rice husk and silicon powders without catalyst or extra protective atmosphere. Results show that the as-synthesized 3C-SiC NWs are well-crystallized and grow along the [111] direction, the diameters of them are in the range of 50-120 nm, and their lengths are up to dozens of micrometers. They own a face-centered cubic structure and are wrapped by a thin amorphous SiO_2 layer (~6 nm). Meanwhile, a few stacking faults perpendicular to the growth direction exist in their crystals. These 3C-SiC NWs exhibit three ultraviolet light emission peaks at wavelengths of 435 nm, 467 nm and 572 nm, respectively, showing they possess a wide range of emission wavelengths. This study is of great significance which extends the research of 3C-SiC NWs and will bring great benefits to their practical applications in optoelectronic devices.

Keywords: 3C-SiC; Fibre technology; Crystal structure; Crystal growth; Photoluminescence property

1. Introduction

SiC nanowires (NWs) have attracted significant attention due to their superior optical, electrical, mechanical and thermal properties [1,2]. They are suitable for applications in the fields of high-temperature semiconductor and functional ceramics [3]. SiC NWs have various crystal structures,