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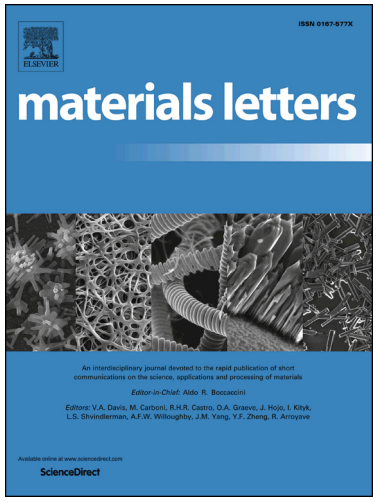

Facile synthesis of C and N co-doped MoO_2 fibers and their microwave absorption performance

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Facile synthesis of C and N co-doped MoO_2 fibers and their microwave absorption performance

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Abstract:

The C and N co-doped MoO_2 fibers were synthesized from an organic-inorganic hybrid by pyrolysis. The structure, morphology, composition, complex permittivity and microwave absorption performance were investigated. The MoO_2 fibers possess one-dimensional morphology with relatively low nitrogen species (2.26 wt %) and high carbon species (11.0 wt %). The MoO_2 fibers/wax composite with 20% filler content achieved a minimum reflection loss of -40.1 dB with a thickness of 3.5 mm, and an optimum effective bandwidth of less than -10 dB of 4.2 GHz with a thickness of 2.0 mm. The MoO_2 fibres is a promising candidate as a lightweight and wide-frequency electromagnetic wave absorber.

Keywords: Fibre technology; Microstructure; C and N co-doped MoO_2; Dielectrics; Microwave absorption

Introduction

Microwave radiation has been one of the most troubling issues for human beings, as it not only increases disease morbidity, but also disturbs the operation of electronic devices[1]. Therefore, it is urgent to design and synthesize microwave absorption materials to solve these problems. As a transition metal compound, molybdenum disulfide (MoS_2), which consists of S-Mo-S triple layers stacked by weak van der Waals forces, have attracted great interest because of its outstanding physicochemical properties and corresponding dimensional structures[2]. In 2015, Ning et al. [3] first reported the dielectric properties and microwave absorption performance of few-layer MoS_2 nanosheets synthesized via the top-down exfoliation method. The maximum reflection loss (RL) was -38.42 dB at a thickness of 2.4 mm, and the corresponding effective bandwidth (RL<−10 dB) was 4.1 GHz (9.6–13.76 GHz). Since then, Mo related complexes have invoked wide research interest as microwave absorption materials with a broad effective absorption bandwidth at thin thicknesses[4-7].

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