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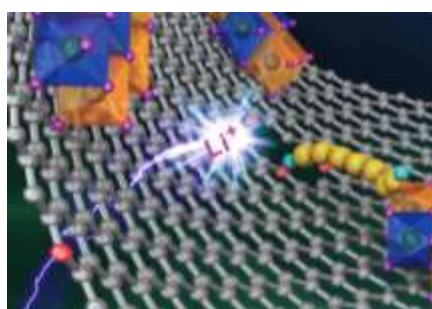
Review

A review of transition metal chalcogenide/graphenenanocomposites for energy storage and conversion

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Graphical Abstract



Recent advances in the applications of transition metal chalcogenides/graphene (TMC/graphene) nanocomposites in future energy storage and conversion are reviewed. The synthesis processes and structures of TMC/graphene, working principle of every energy device, and the electrochemical performances are summarized.

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ABSTRACT

To meet the ever-increasing energy demands, advanced electrode materials are strongly requested for the exploration of advanced energy storage and conversion technologies, such as Li-ion batteries, Li-S batteries, Li-/Zn-air batteries, supercapacitors, dye-sensitized solar cells, and other electrocatalysis process (*e.g.*, oxygen reduction/evolution reaction, hydrogen evolution reaction). Transition metal chalcogenides (TMCs, *i.e.*, sulfides and selenides) are forcefully considered as an emerging candidate, owing to their unique physical and chemical properties. Moreover, the integration of TMCs with conductive graphene host has enabled the significant improvement of electrochemical performance of devices. In this review, the recent research progress on TMC/graphene composites for applications in energy storage and conversion devices is summarized. The preparation process of TMC/graphene nanocomposites is also included. In order to promote an in-depth understanding of performance improvement for TMC/graphene materials, the operating principle of various devices and technologies are briefly presented. Finally, the perspectives are given on the design and construction of advanced electrode materials.

1. Introduction

With the development of human society and economy, aggravating energy crisis as well as accompanying environmental degradation and ecological destruction become seriously threats for sustainable society [1-4]. Therefore, the exploration of

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