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ZnO @ N-doped porous carbon/ Co_3ZnC core-shell heterostructures with enhanced electromagnetic wave attenuation ability

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Abstract: This study develops a synthetic strategy to rapidly construct a ZnO core and N-doped porous carbon with embedded Co_3ZnC nanoparticles shell heterostructure for electromagnetic wave absorption. ZnO colloidal is used as template and zinc source to fabricate ZIF67@ZIF8@ZnO core-shell structures as precursors. After annealing, the double-layered ZIF coating transforms into N-doped porous carbon and dispersive Co_3ZnC nanoparticles shell outside the ZnO core. Compared with pristine ZnO colloidal and pure ZIF67 derived porous carbon/Co nanoparticles composites, the core-shell heterostructures shows the most prominent electromagnetic wave absorption properties with strong absorption (minimum reflection loss of -62.9 dB) and broad effective absorption bandwidth (5.5 GHz). The enhanced properties can be ascribed to the multiple interfaces, doped atoms and groups, as well as the improved impedance matching endowed by the unique core-shell structure.

Keyword: core-shell, MOF, porous carbon, electromagnetic wave absorption

1. Introduction

In the past decade, core-shell micro/nano particles have been attracting much attention due to their