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Abstract:

Electromagnetic absorption materials have drawn increasing attention owing to their wide applications in military, aerospace, communication and the electronic industry. Efficient microwave absorption with tunable bandwidth and thermal stability is a great challenge. Herein, we fabricate a novel 3D hierarchical Co_3O_4-rGO hybrid-architecture by a facile, green and highly tunable strategy. The porous Co_3O_4 flower is assembled uniformly, introducing great amount of interfaces. Tailoring Co_3O_4 flowers could improve interfacial polarization and dipole polarization as well as conductive network, highly tuning the hybrid-architectures and electromagnetic properties. The reflection loss (RL) reaches -61 dB at Co_3O_4/rGO ratio of 2:1, as well as frequency-selective absorption. Furthermore, the RL are relatively stable and the bandwidth is broadened almost covering the whole investigated frequency at elevated temperature of 353-473 K. The result is ascribed to utilizing multi-interface magnetic micro-flowers to tuning impedance matching, which is accompanied with strong relaxation loss and electrical loss, as well as magnetic loss. Our work confirms that 3D hierarchical Co_3O_4-rGO hybrids as a potential candidate for high-efficiency microwave absorbers in harsh environment, and provide a novel pathway for designing microwave absorber in the future.

Keywords: flower-like Co_3O_4, rGO, 3D hybrid-architectures, electromagnetic characterization, microwave absorption