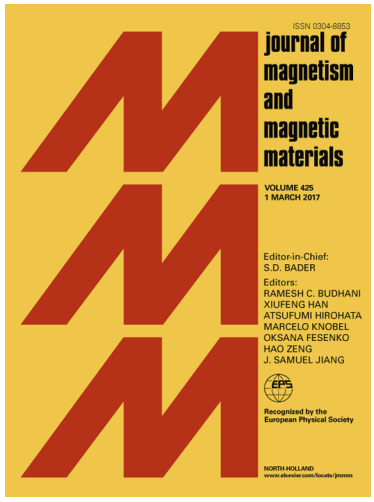

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PII: S0304-8853(18)31356-8
DOI: https://doi.org/10.1016/j.jmmm.2018.09.019
Reference: MAGMA 64301

To appear in: *Journal of Magnetism and Magnetic Materials*

Received Date: 5 May 2018
Revised Date: 27 July 2018
Accepted Date: 5 September 2018

Please cite this article as: D. Xu, X. Xiong, P. Chen, Q. Yu, H. Chu, S. Yang, Q. Wang, Superior corrosion-resistant 3D porous magnetic graphene foam-ferrite nanocomposite with tunable electromagnetic wave absorption properties, *Journal of Magnetism and Magnetic Materials* (2018), doi: https://doi.org/10.1016/j.jmmm.2018.09.019

Superior corrosion-resistant 3D porous magnetic graphene foam-ferrite nanocomposite with tunable electromagnetic wave absorption properties

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Abstract

Superior corrosion-resistant magnetic graphene foams decorated by Fe_3O_4 (MGF@Fe_3O_4) have been constructed through *in-situ* simultaneous deposition of ferrous ion (Fe^{2+}) induced graphene oxide (GO). Their chemical composition, micro structure and properties were investigated in detail by Raman spectroscopy, X-ray photoelectron spectroscopy (XPS), X-ray diffraction (XRD), scanning electron microscopy (SEM), transmission electron microscopy (TEM), vibrating sample magnetometer (VSM) and vector network analyzer. These 3D porous MGF@Fe_3O_4 exhibit much better electromagnetic wave (EMW) absorption properties and corrosion resistance than 2D hybrid materials of magnetic metal particles and graphene sheets. The tunable EMW absorption performance can be easily implemented by tailoring their micro structure. Their minimum reflection loss (RL_{min}) value reaches -64.4 dB at 10.8 GHz and maximum effective absorption bandwidth (*EAB*) is up to 6.0 GHz from 12 GHz to 18 GHz with a matching thickness of 2.4 mm. After treatment in hydrochloric acid for 70 days, the acid-treated MGF@Fe_3O_4 still keeps excellent EMW absorption performance with their decrease of saturation magnetization lower