Significant reduction of saturation magnetization and microwave-reflection loss in barium-natural ferrite via Nd^{3+} substitution

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Abstract	To minimize the signal degradation, many electronic devices require efficient microwave absorbers with very low reflection-losses within the X-band. We prepared a series of trivalent neodymium-ion (Nd3+) substituted barium-natural ferrite using a modified solid-state reaction method. The effect of the Nd3+-ion content on the structure, surface morphology, magnetic properties, and microwave reflection loss was studied. The composites were characterized using X-ray diffraction, a vibrating sample magnetometer, scanning electron microscopy, and a vector network analyzer. The XRD patterns of the sample without Nd3+ reveal the presence of BaFe12O19 (hexagonal) and BaFe2O4 (rhombohedral) phases. Furthermore, a new hexagonal crystal phase of Ba6Nd2Fe4O15 appeared after substituting Nd3+. The average size of the prepared barium-natural ferrite particles was estimated to be between 0.4 and 0.8 mu m. Both saturation magnetization and microwave reflection losses of these barium-ferrites were significantly reduced by increasing the Nd3+ content. (C) 2018 Elsevier B.V. All rights reserved.
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