

BaCO₃ mediated modifications in structural and magnetic properties of natural nanoferrites

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Abstract	<p>Preparing M-type barium hexaferrite and improving the magnetic response of natural ferrites by incorporating barium carbonate (BaCO₃) is ever-demanding. Series of barium carbonate doped ferrites with composition (100-x)Fe₃O₄ center dot xBaCO₃ (x=0, 10, 20, 30 wt%) are prepared through solid state reaction method and sintered gradually at temperatures of 800 and 1000 degrees C. Nanoparticles of natural ferrite and commercial BaCO₃ are used as raw materials. Impacts of BaCO₃ on structural and magnetic properties of these synthesized ferrites are inspected. The obtained ferrites are characterized using scanning electron microscopy (SEM), X-ray diffraction (XRD) and vibrating sample magnetometer (VSM) at room temperature. Uniform barium hexaferrite particles in terms of both morphology and size are not achieved. The average crystallite size of BaFe₁₂O₁₉ is observed to be within 30-600 nm. The sintering process results phase transformation from Fe₃O₄ (magnetite) to alpha-Fe₂O₃ (hematite) and the formation of hexagonal barium ferrite crystals. The occurrence of barium crystal is found to enhance with the increase of BaCO₃ concentrations up to 20 wt% and suddenly drop at 30 wt%. Saturation and remanent magnetization of the doped ferrites are significantly augmented up to 1637 and 8.92 emu g(-1), respectively compared to their pure counterpart. Furthermore, the coercivity field is slightly decreased as BaCO₃ concentrations are increased. BaCO₃ mediated improvements in the magnetic response of natural ferrites are demonstrated. (C) 2014 Elsevier Ltd. All rights reserved.</p>
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