A synthesis concept for a nanostructured $\text{CoFe}_2\text{O}_4/\text{BaTiO}_3$ composite: Towards multiferroics

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Abstract

The synthesis of a periodically ordered, nanostructured composite consisting of CoFe_2O_4 and BaTiO_3 is presented. In a first step, mesoporous CoFe_2O_4 is prepared by the structure replication method (nanocasting) using mesoporous KIT-6 silica as a structural mold. Subsequently, BaTiO_3 is created inside the pores of CoFe_2O_4 by the citrate route, resulting in a well-ordered composite material of both phases. The two components are known for their distinct ferroic properties, namely ferrimagnetism (CoFe_2O_4) and ferroelectricity (BaTiO_3), respectively. Therefore, this proof of synthesis concept offers new perspectives in the fabrication of composite materials with multiferroic properties.