MICROWAVE AND SPARK PLASMA SINTERING OF NANOSTRUCTURED PMN-PT/Fe_2CoO_4

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Although biphasic nanostructured PMN-PT/Fe_2CoO_4 composites are important candidate materials for application mainly in electromagnetic sensors, microwave devices and nonvolatile memories, very few reports have focused on microwave and spark plasma processing of PMN-PT/Fe_2CoO_4. In this work, (1-x)PMN-PT/(x)Fe_2CoO_4, where $0.2 \leq x \leq 0.5$ mol, was processed by microwave and spark plasma sintering techniques, and comparisons were made of the samples' microstructures and properties. The microwave-processed samples were sintered for 10 min at 900°C and 950°C. Microwave sintering was found to yield homogenous ceramic composites with density comparable to that obtained by spark plasma sintering. Spark plasma sintering for 10 min at 800°C and 850°C, respectively, yielded highly dense (98-99%) PMN-PT/Fe_2CoO_4, while microwave sintering yielded PMN-PT/Fe_2CoO_4 with maximum relative densities of 93-97%. In microwave sintered samples, the magnetoelectric properties increased along with increasing content of up to x=3 in Fe_2CoO_4, reaching a value of 8.2 mV/cmOe. Conversely, as grain size decreased, the spark plasma sintered samples showed declining magnetoelectric properties, which reached a value of 6.6 mV/cmOe.