

Thermoelectric Properties of $\text{Bi}_2\text{Ca}_2\text{Co}_2\text{O}_y$ Polycrystalline Textured Materials

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The texturation of $\text{Bi}_2\text{Ca}_2\text{Co}_2\text{O}_y$ (BC222) polycrystalline materials using the hot-forging technique has been investigated. We revealed a partial-melting reaction during the sintering step leading to the growth of very large plate like-grains (up to 50 μm in diameter and several μm in thickness). Based on DTA/TGA, X-ray diffraction and SEM analysis, we detailed the mechanisms of reaction during the heat treatment. This liquid phase reaction represents a strongly interesting aspect to promote an efficient stacking and sliding of grains during the thermomechanical treatment. The hot-pressing conditions and grain size were shown to strongly affect the thermoelectric properties. Based on an innovative quantitative texture analysis, we established a clear relationship between the transport properties, the texture strength and the microstructure.