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Texture-Properties-Microstructure Relationship in Highly Oriented $Ca_3Co_4O_9$ Bulk Materials

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The $Ca_3Co_4O_9$ (Co349) phase interests many researchers due to its relative good thermoelectric performance and resistance to moisture and humidity. However, to consider the introduction of this material in power generation, the performances have to be improved. One of the well-known ways for the enhancement of transport properties consists of the alignment of plate-like grains in the bulk materials due to the highly anisotropic properties of the Co349 layered structure. In that case, a quantitative texture analysis is required to establish clearly the texture-physical properties-microstructure relationships for a best understanding and design of improved bulk thermoelectric materials. X-ray and neutron diffraction measurements, based on the acquisition of several 2θ-scans for various χ angles, were used to calculate the orientation distribution and related normal and inverse pole figures. It revealed a real interest to quantitatively determine the fibre texture strength in Co349 textured ceramics. Different processed materials, synthesised by the magnetic grain alignment and hot-pressing methods, were compared in terms of physical properties and texture strength.