

Neutron diffraction texture study of NdFeB as-cast alloys and magnets.

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Abstract

Extrinsic magnetic anisotropy in NdFeB permanent magnets results from the hot forging process of NdFeB bulk alloys. This process leads to microstructural changes and among them, to the development of a texture induced by hot deformation of the polycrystalline alloy. This neutron diffraction texture study aims to demonstrate the (001) crystallographic fibre texture of the Nd₂Fe₁₄B phase developed along the deformation direction. The starting alloy already shows a certain texture in the as-cast state due to thermal gradients on cooling. This initial texture does not really affect the specific orientation developed on forging, as soon as the deformation rate is sufficient. The comparison between forging (very high strain rate) and pressing (low strain rate) shows a higher texturation level associated to higher magnetic anisotropy when the hot deformation is slow.

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