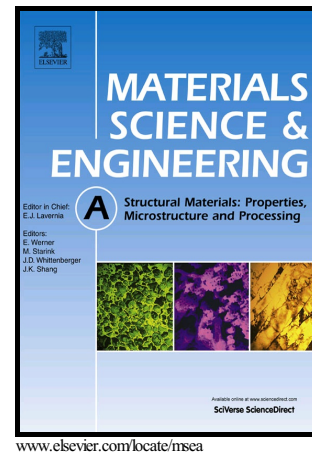


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Texture and microhardness of Mg-Rare Earth (Nd and Ce) alloys processed by high-pressure torsion

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Abstract

The influence of high-pressure torsion (HPT) processing on the texture and microhardness of two binary Mg-RE (RE=Nd and Ce) alloys was investigated using X-ray diffraction and Vickers microhardness measurements. Disks cut from the alloys were processed by HPT at room temperature for up to 10 turns. The precipitation products of both alloys were identified using synchrotron radiation. The results show that both alloys exhibit a weak basal texture where the c-axis of most grains is shifted 15° from the shear direction. An Mg-1.44Ce (wt. %) alloy showed a continuous decrease in the texture strength which may be due to the effect of second precipitation phases (Mg₁₇Ce₂ and MgCe₂). The microhardness of both alloys increased significantly with increasing HPT turns but levelled-off beyond about one HPT turn. Maximum values of ~65 and ~96 Hv were achieved which are significantly higher than the hardness of the undeformed Mg-Ce and Mg-Nd alloys.

Keywords: Mg-Rare Earth alloy; High-Pressure Torsion; Microhardness; Twinning; Second phase; Texture.

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