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# Deformation Mechanisms of Mg-Based Composite Studied by Neutron Diffraction and Acoustic Emission

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**Abstract :** Deformation mechanisms in an Mg-Al-Ca alloy reinforced with short alumina fibres were studied by acoustic emission and in-situ neutron diffraction method. The fibres plane orientation with respect to the loading axis was found to be a key parameter, which influences the acting deformation processes, such as twinning or dislocation slip. In-situ neutron diffraction tests were measured at different temperatures from room temperature (RT) to 200°C. The measurement shows the lattice strain changes in the matrix and also in the reinforcement phase depending on macroscopic compressive deformation and stress. In case of parallel fibre plane orientation, the increment of compressive lattice strain is lower in the matrix and higher in the fibres in comparison to perpendicular fibre orientation. Furthermore, acoustic emission results indicate a larger twinning activity and more frequent fibre cracking in sample with perpendicular fibre plane orientation. Both types of mechanisms are more dominant at elevated temperatures.

**Keywords :** neutron diffraction, acoustic emission, magnesium based composite, deformation mechanisms
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