

Abstract: In this present work, the dynamics of deformation mechanisms activated in binary magnesium-gadolinium alloys with respect to amount of Gd were investigated with *in-situ* experimental methods. Cast alloys are characterized by random texture. Compression test were done at room temperature with simultaneous record of acoustic emission response. The acoustic emission signal was subsequently analysed using advanced clustering method providing information about the dominant deformation mechanisms. High speed camera was used to study the dynamics of twinning, including estimation of the velocity of twin propagation with respect to Gd concentration. The deformation tests were repeated in a chamber of scanning electron microscope (*in-situ* SEM) with concurrent following the microstructure development using secondary electrons and electron back-scattered diffraction (EBSD) in different stages of the deformation. Main goal of this measurements was to identify active slip systems and the progress of twin volume fraction during deformation.

Keywords: magnesium alloy, deformation tests, acoustic emission, high-speed camera, electron microscopy, twinning