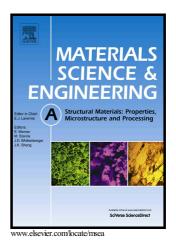
# Author's Accepted Manuscript

Effects of Zn/Gd ratio on the microstructures and mechanical properties of Mg-Zn-Gd-Zr alloys

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#### Effects of Zn/Gd ratio on the microstructures and mechanical properties

## of Mg-Zn-Gd-Zr alloys

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### Abstract

The microstructures and mechanical properties of three Mg-Zn-Gd-Zr alloys with specific Zn/Gd mass ratios to form different types of phases are systematically investigated by casting and subsequent indirect hot extrusion. With the Zn/Gd ratio increases from 0.27 to 1.4, second phases change from W (Mg<sub>3</sub>Gd<sub>2</sub>Zn<sub>3</sub>), X (Mg<sub>12</sub>GdZn) and Mg<sub>5</sub>(Gd,Zn) to W, I (Mg<sub>3</sub>Zn<sub>6</sub>Gd) and MgZn<sub>2</sub>. After extrusion, the needle-like and dispersively distributed I-phase provides effective strengthening effects to the experimental alloys. The lamellar-like X-phase in the as-extruded condition is hard and fragile to start cracks. W-phase owns superior ductility in these alloys. A high performance I-phase containing Mg-7Zn-5Gd-0.6Zr alloy is prepared by conventional casting and subsequent hot extrusion. It owns an ultimate and yield strength of 350 MPa and 285 MPa, respectively, and its elongation is 13.6%.

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