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Effect of small/large alternative extrusion cycles and precipitates on the super high strength of A800 (Al-Zn-Mg-Cu) aluminium alloys

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Abstract

The Al-Zn-Mg aluminium alloys, subjected to the one-step ageing treatments, were recognized as the high mechanical strength aluminium alloys (i.e., the tensile strength ~ 550 MPa) in the world. Recently, the A800 (Al-8.9Zn-2.1Mg, wt%) aluminium alloys possessing the highest mechanical strength in aluminium alloys (i.e., the tensile strength ~ 784 MPa) have been successedly developed. The newely-developed heat treatment (i.e., small/large alternative extrusion cycles) combined with nano-scaled precipitates apparently resulted the higher mechanical strength. Complementary to the electron backscattered diffraction (EBSD) investigation on the grain size distribution, Cs-corrected high-angle-annular-dark-field scanning-transmission-electron microscopy (Cs-corrected HAADF-STEM) extrapolate the contribution of precipitate evolution on the mechanical properties.