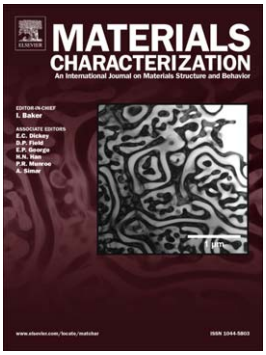

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Microstructure evolution and mechanical properties of nano-SiCp/AZ91 composite processed by extrusion and equal channel angular pressing (ECAP)

X.G. Qiao [a], T. Ying [a], M.Y. Zheng [a]*, E.D. Wei, K. Wu [a], X.S. Hu [a], W.M. Gan [b], H.G. Brokmeier [b], I. S. Golovin [c]

[a] School of Materials Science and Engineering, Harbin Institute of Technology, Harbin 150001, PR China

[b] Institute of Materials Research, Helmholtz-Centre Geesthacht, D-21502, Geesthacht, Germany

[c] Department of Physical Metallurgy of Non-Ferrous Metals, National University of Science and Technology "MISiS", Leninsky ave. 4, 119049 Moscow, Russia

* zhenghe@hit.edu.cn, Tel.: +86 451 86402291, fax: +86 451 86413922

Abstract: Nano-SiCp/AZ91 magnesium matrix composite was fabricated by stir casting. The as-cast ingots were extruded at 350 ^{o}C, then processed by equal channel angular pressing (ECAP) at various temperatures (250^{o}C, 300 ^{o}C and 350 ^{o}C). Grains are significantly refined after the extrusion and the ECAP. A basal fibre texture was detected by neutron diffraction after the extrusion, which inclines about 45^{o} to the extrusion direction (ED) after the ECAP. Nano-scaled SiC particles agglomerate in the as-cast composite. After the extrusion, the agglomeration tends to form continuous or discontinuous strips along the extrusion direction. By application of the ECAP, the agglomerated SiC particles are partly dispersed and the strips formed during the extrusion tend to be thinner and broken with the increasing pass number. The yield tensile strength (YTS) and the ultimate tensile strength (UTS) of the composite are dramatically increased after the extrusion. ECAP for one pass at various temperatures further increases the strength, however, the YTS decreases with the increasing ECAP temperature and the pass number. The Orowan equations predict the maximum YTS of the composite may be up to 400 MPa providing SiC particles are homogenously distributed in the matrix.