Investigation of the grain refinement and texture of aluminium alloy processed by Friction-Assisted Lateral Extrusion Process (FALEP)

Máté Szűcs*[1], Muhammad Kh.aljamea[1], Surya Nilamegam Kumaran[2], and Laszlo S. Toth[1,2]

[1]Institute of Physical Metallurgy, Metal forming and Nanotechnology, University of Miskolc – Hungary
[2]Laboratoire dÉtude des Microstructures et de Mécanique des Matériaux – Université de Lorraine, Centre National de la Recherche Scientifique, Arts et Métiers Sciences et Technologies, Centre National de la Recherche Scientifique : UMR7239 – France

Abstract

The Friction-Assisted Lateral Extrusion (FALEP) is an SPD process which can apply extremely large shear strain to a bulk in a single step, to obtain ultra-fine-grained sheet metal. In the present work, the samples of bulk aluminum alloy were processed at room temperature by FALEP with different p/c ratios where the p is the entry - and c is the exit size of the deformed sample. Before the FALEP tests, a recrystallization heat treatment with a long holding time was applied to the samples to coarsen the grain structure to a large degree. The deformed samples were characterised by EBSD measurements and the effect of p/c ratio on the texture and grain refinement was investigated. EBSD results show texture gradient from top to bottom of the samples. Because of the excellent grain refinement capacity, FALEP is able to strengthen the material extremely applying only one single step of process.

Keywords: FALEP, grain refinement, EBSD texture

*Speaker