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## Microstructure and mechanical properties of ultrafine grained aluminium plates

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In present study, ultrafine grained plates made of commercially pure aluminium were obtained in the hybrid process. Initially bar-shaped samples with dimensions of 26 x 26 x 130 mm were processed using severe plastic deformation process, namely multi-turn Equal Channel Angular Pressing (mtECAP). Subsequently, the flattening was performed via multi-stage upsetting process using smooth anvils till 3 mm in thickness was achieved. Furthermore, the initial bar was also flattened in order to reveal the differences between all stages of plastic deformation. The microstructural characterization was performed at each stage of processing and consisted of investigation using Transmission Electron Microscope and Electron Backscatter Diffraction on Scanning Electron Microscope. Mechanical properties were evaluated based on tensile tests. Results have proved the significant grain refinement for separate processes (mtECAP, upsetting), however, the lowest grain size with average value below 700 nm and a significant fraction of 80% of high angle grain boundaries was achieved only by implementing the hybrid process. The EBSD map of the latter one is illustrated in Fig. 1. In the case of mechanical properties, apart from significant mechanical strength improvement, low anisotropy of mechanical properties were obtained for sample after the hybrid process.

### Biography

Marta Orlowska (Lipinska) is a PhD student at Warsaw University of Technology, Faculty of Materials Science and Engineering. She has published 10 papers in reputable journals. During her studies she is working with severe plastic deformation methods.

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