J Material Sci Eng 2016, 5:7 (Suppl)
http://dx.doi.org/10.4172/2169-0022.C1.047

6th International Conference and Exhibition on
Materials Science and Engineering
September 12-14, 2016 Atlanta, USA

Texture property dependency during thermally activated plane strain compression

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Plane strain compression tests are generally proposed for sheet metals to attain large strains encountered during industrial forming processes. Formability of sheet metal depends both on intrinsic (microstructure, precipitate, constituent particles etc.) and extrinsic (temperature, strain rate etc.) parameters, formability may be improved by increasing temperature. In the present investigation, an effort has been made to record the changes in flow curve due to change in strain rate and temperature through plane strain compression tests for AA6016 in naturally aged condition (T4). Subsequently, the changes in microstructure have been evaluated by gallium enhanced microscopy (GEM) and crystallographic texture by electron back scattered diffraction (EBSD) and X-ray diffraction (XRD). A remarkable change in plastic anisotropy during PSC is observed when the temperature is increased from room to 250°C. Although textural changes are rarely affected by the temperature change, it can still be concluded that at different temperatures creation of different families of slip systems could be possible.

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Determination of the minimum sample size for a reliable strength measurement of talc-filled polypropylene fibers

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Accurate determination of mechanical properties plays an important role to comment on improvement in the mechanical properties of particle filled PP fibers. However, the existing standards are not totally suitable for reliable strength determination of particle filled PP fibers. In the framework of this study, microsized talc particle-filled PP fibers were produced with different talc ratio, and tensile strength measurements were preformed with various gage lengths. Statistical Akaike information criterion analysis showed that strength distribution of talc-filled PP fibers is best characterized by Weibull distribution function. It is reported that, the gage length has almost no influence of Weibull parameters of pure PP fibers whilst strong effects on Weibull parameters of talc-filled PP fibers. It is shown that if the tensile strength of talc-filled PP fibers is to be measured, at least 50 samples, which is more than value suggested by existing standard, should be used for a reliable determination of Weibull parameters. Therefore, the main aim of this study is to question the feasibility of minimum sample size suggested by the existing ASTM D3822 standard for reliable strength measurement of talc filled PP fibers.

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