MMC-05: Anisotropic Mechanical Properties of Extruded AZ System Magnesium Alloys

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In AZ system extruded magnesium alloys, mechanical properties for various directions against extrusion directions have been investigated. It became clear that the anisotropic yield strength and the elongation depend on the extrusion ratio and aluminum content. By evaluating the grain size and the texture of the extrusions, those phenomenon are seemed to be related to the internal structure of the materials.

MMC-06: Simulation of Infiltration of Molten Alloy to Porous Preform by Low Pressure

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Metal fiber perform reinforced aluminum alloy composite were made by infiltrating molten metal under low pressure casting process. The infiltration behavior of filling pattern and the velocity profile with low-pressure casting process was investigated. The thermocouple was inserted into the preform in order to observe infiltration behavior. The infiltration of applied pressure time, 1sec, 2sec and 5sec under constant pressure of 0.4MPa is completely filled during 0.4sec, 0.8sec and 1.2sec. In these conditions, Molten aluminum alloy has been successfully infiltrated FeCrSi metal fiber preform by low-pressure casting process. For reliability of composites, it was observed the porosity of composites. It was developed the automobile piston with FeCrSi reinforced aluminum alloy that is 0% porosity of the optimal applied pressure and applied pressure time.

Lunch

13:30 p.m. - 15:30 p.m.

Room A

PMC-II: POLYMERS AND POLYMER MATRIX COMPOSITES**PMC-07: An Elongated Tetrakaidecahedron Cell Idealization of the Microstructure of Rigid Polyurethane Foam**

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An elongated tetrakaidecahedral cell model is developed to examine its applicability as an idealization of the microstructure of rigid polyurethane foam. The ability of this model to represent the anisotropic mechanical behavior of such foam is studied. Elastic tensile load-deformation and fracture properties are obtained from analytical solutions based on the proposed cell geometry. Elastic and fracture responses are simulated using finite element model. In tandem, the mechanical properties and behavior of actual foam samples are derived from experimental tests, which include acquisition of images of cell geometry using CT scanning, as well as visual data on cell deformation. Results indicate that the proposed tetrakaidecahedron model bears similarity with cells in polyurethane foam. Finite element analysis reveals resemblance between the fracture behavior of the model and that of the actual foam.

PMC-09: Influence of Exfoliated and Intercalated Clay Nanoplatelets on Thermophysical Properties of Unsaturated Polyester/Clay Nanocomposites

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The thermophysical properties of unsaturated polyester (UPE) nanocomposites reinforced by organomontmorillonite clay nanoplatelets are reported. The UPE nanocomposites were processed with cobalt naphthenate as a promoter and 2-butanone peroxide as an initiator. The clay nanoplatelets were sonicated in acetone for 2 hrs to be dispersed in the UPE matrix. Vacuum extraction removed not only the acetone but also the styrene present in the UPE solution. Therefore, the lost amount of styrene was added to the clay/UPE mixture. The storage modulus measured by dynamic mechanical analysis (DMA) increased with increasing clay content. An even higher storage modulus enhancement was obtained when the organo-clay nanoplatelets were completely exfoliated. The reinforcing effect of both exfoliated and intercalated clay nanoplatelets was theoretically evaluated with the Halpin-Tsai equations. The glass transition temperature remained constant with increasing clay content. The heterogeneous polymer network of the intercalated clay nanocomposites was determined based on a larger peak factor value from the loss factor curves measured by DMA.

PMC-10: Effects of Polycarbosilane Addition on the Mechanical Properties of Single-Walled Carbon Nanotube Solids

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Single-walled carbon nanotubes (SWCNTs) are often produced in a form of bundles during their synthesis process. However, the bundles could slide easily on each other as they are held together by a weak van der Waals interaction. This weak cohesion is one of the major obstacles in the preparation of strong macroscopic solid structures composed of SWCNTs. Here, we have attempted to improve the stability of the links between SWCNTs within and between the bundles by introducing polycarbosilane (PCS) (10 mass%) to purified SWCNTs. Then, the SWCNT-PCS composite was prepared by the hot pressing the SWCNT-