



Seminar Invitation

Mechanical Properties and Microstructure of Porous Magnesium Composites

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Abstract

Porous materials are attractive for various energy and environment related applications. The introduction of pores into magnesium composites can lead to ultralightweight materials with high specific strength that are appealing to be used in the components of sports and passenger cars, trucks, and aircrafts to reduce the weight of transportation tools. The weight reduction will increase the fuel efficiency and decrease the waste gas emission. We synthesized porous magnesium composites using a powder metallurgical method and characterized them using optical microscope, scanning electron microscope, micro-CT, and mechanical testing. The microstructure observations showed that the average sizes of the pores inside the samples increased with the increase of porosity, and pore size varies in the range of several microns to hundreds of microns. The increase of overall porosity resulted in more large and connected pores, and larger specific surface area. Over 80% of the pores have the aspect ratio ≤ 2 and over 96% of the pores have the aspect ratio ≤ 3 . The mechanical testing data indicated that (i) there were three regions for the stress–strain curves: an initial region that deformed elastically along an approximately linear line, a long and intermediate region, and a densification region with a steep increase of stress; (ii) the synthesized porous magnesium composites possessed lower density and higher yield strength than those of some cast dense magnesium; and (iii) the average yield strength was anisotropic for the synthesized porous magnesium composites.