World Academy of Science, Engineering and Technology
International Journal of Mechanical and Industrial Engineering
Vol:8, No:11, 2014

Thermal Expansion Coefficient and Young's Modulus of Silica-Reinforced Epoxy Composite

Authors : Hyu Sang Jo, Gyo Woo Lee

Abstract : In this study, the evaluation of thermal stability of the micrometer-sized silica particle reinforced epoxy composite was carried out through the measurement of thermal expansion coefficient and Young's modulus of the specimens. For all the specimens in this study from the baseline to those containing 50 wt% silica filler, the thermal expansion coefficients and the Young's moduli were gradually decreased down to 20% and increased up to 41%, respectively. The experimental results were compared with filler-volume-based simple empirical relations. The experimental results of thermal expansion coefficients correspond with those of Thomas's model which is modified from the rule of mixture. However, the measured result for Young's modulus tends to be increased slightly. The differences in increments of the moduli between experimental and numerical model data are quite large.

Keywords : thermal stability, silica-reinforced, epoxy composite, coefficient of thermal expansion, empirical model
Conference Title : ICHTA 2014 : International Conference on Heat Transfer and Applications
Conference Location : Kyoto, Japan
Conference Dates : November 13-14, 2014