

Simulations on Tensile and compressive properties of Al-Cu metal intermetallic laminates (MILs) using FEA

B. Blessto

Advanced Materials Processing Laboratory, Department of Metallurgical and Materials Engineering, National Institute of Technology, Tiruchirappalli-620015, India
bblessto@gmail.com

Nair Sarath Giridharan, K. Sivaprasad, D. Nagarajan

Advanced Materials Processing Laboratory, Department of Metallurgical and Materials Engineering, National Institute of Technology, Tiruchirappalli-620015, India

ABSTRACT

Al-Cu pure metal without intermetallics and three different Metal Intermetallic Laminates (MIL) with varying intermetallic phase quantity were considered in this study. The varying thickness of intermetallic phases viz, Al₂Cu, AlCu and Al₄Cu₉ were obtained by controlling the process parameters. Finite Element analysis of these MILs was carried out to analyze the mechanical response of these laminates. The mechanical properties data were obtained from the nano indentation studies and quasistatic compression tests were simulated using Abaqus software by loading the MILs in perpendicular direction. The stress distribution across each laminate was analyzed and the stress-strain graph for every individual MIL was generated from the simulation results. The strength of the MIL was found to increase with the increase in the volume fraction of the intermetallic phases. It is also seen that, among all the three MILs, MIL-3 (Processing parameters: 12 MPa, 475 °C and 120 min) showed higher strength. This is attributed to the presence of higher thickness of the intermetallics formed by the application of higher temperature and time.

Key words: Metal Intermetallic Laminates; Abaqus; Finite Element Analysis; Tensile Properties