The mechanical properties of al2o3-reinforced aluminum a356 with grain refiner al-5ti-1b fabricated using the stir casting method

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Abstrak

Al2O3 reinforced aluminum A356 has been successfully fabricated using the stir casting method. The development of current technology requires a material that is light, strong, tough, and corrosion and wear resistant, in addition to various other advanced properties. A composite material was therefore developed. Composite materials can be used in a wide range of strategic sectors such as the automotive, military, aerospace, and electrical industries. This study aims to develop a composite material that consists of aluminum A356 as the matrix and micro Al2O3 as the reinforcement, with 8 wt% magnesium as the wetting agent with the addition of grain refiner TiB at 0; 0.01; 0.0347; 0.0362; 0.0622; and 0.0689 wt% using the stir casting method. The material characterization comprises tensile testing, hardness testing, wear testing, chemical composition testing (OES and XRD), and microstructure testing (OM, SEM, and EDX). The test results revealed that the addition of 0.0347 wt% TiB was capable of reducing the size and changing the shape of a long and coarse grain to become round and fine, thereby significantly increasing its tensile strength, hardness, and wear resistance, but decreasing the elongation and ductility.