Mechanical and microstructure characterization of aluminium-copper (Al-Cu) reinforced with in situ titanium diboride (TiB_2)

ABSTRACT

Aluminium based in-situ metal matrix composites (MMCs) have better properties and performance when compared to ex-situ MMCs. In this research, aluminium-copper (Al-Cu) alloy was reinforced with 1 to 6wt.% titanium diboride (TiB_2). Al-MMCs has been fabricated with salt route reaction process at 800 °C via potassium hexafluorotitanate (K_2TiF_6) and potassium tetrafluoroborate (KBF_4) salts. Al-Cu composites reinforced with 1,2, 3 and 6wt.% TiB_2 then will be characterized their mechanical properties and microstructure. From results obtained, increased TiB_2 contents will increased the value of tensile and hardness properties of Al-Cu alloy. The composites synthesized using in-situ techniques exhibit the presence a uniform distribution of reinforcement that tends to be fine and associated with a clean interface with the metallic matrix. In order to achieve a good mechanical and wear properties it is important to control Al_3Ti phase formation during the synthesis of in situ Al-Cu/TiB_2 composites.

Keyword: Al-Cu alloy; In situ; Salts route reaction; Titanium diboride