

Development of AA2024 Matrix Composites Reinforced with Micro Yttrium through Cold Compaction with Superior Mechanical Properties

Authors : C. H. S. Vidyasagar, D. B. Karunakar

Abstract : In this present work, five different composite samples with AA2024 as matrix and varying amounts of yttrium (0.1-0.5 wt.%) as reinforcement are developed through cold compaction. The microstructures of the developed composite samples revealed that the yttrium reinforcement caused grain refinement up to 0.3 wt.% and beyond which the refinement is not effective. The microstructure revealed Al₂Cu precipitation which strengthened the composite up to 0.3 wt.% yttrium reinforcement. Upon further increase in yttrium reinforcement, the intermetallics and the precipitation coarsen and their corresponding strengthening effect decreases. The mechanical characterization revealed that the composite sample reinforced with 0.3 wt.% yttrium showed highest mechanical properties like 82 HV of hardness, 276 MPa Ultimate Tensile Strength (UTS), 229 MPa Yield Strength (YS) and an elongation (EL) of 18.9% respectively. However, the relative density of the developed composites decreased with the increase in yttrium reinforcement.

Keywords : mechanical properties, AA 2024 matrix, yttrium reinforcement, cold compaction, precipitation

Conference Title : ICEMA 2019 : International Conference on Engineering Materials and Applications

Conference Location : Paris, France

Conference Dates : July 18-19, 2019