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The International Debate on Effect of Ageing on Microstructure, Corrosion and Wear Behavior of Stir Cast Al7075/Sic Mmc

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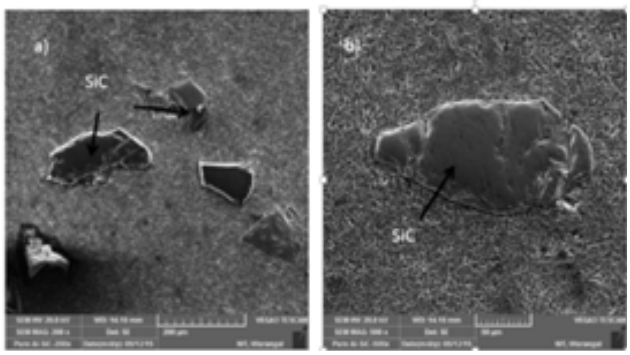
Statement of the Problem: Aluminum MMCs are preferred over other conventional materials in the fields of aerospace, automotive and marine applications owing to their improved properties like high strength to weight ratio, high temperature property, good wear resistance etc. In the present paper an attempt has been made to synthesize metal matrix composite using Al7075 as matrix material reinforced with ceramic SiC particles of particle size 125µm using liquid metallurgy route by stir casting technique. Reinforcement particles were preheated to a temperature of 11000C and then dispersed in three steps into the vortex of molten Al7075 alloy to improve the wettability and distribution of the particles. The Al7075/SiC MMC was subjected to heat treatments to study the influence of artificially ageing at 1500C, 1750C and 2000C for 6h, 10h, 12h and 15h on microstructure, hardness, corrosion and sliding wear behavior. Microstructural characterization for the heat-treated condition was carried out by paying special emphasis to the distribution of SiC particles in Al matrix and interfacial bonding between them. It was observed that hardness decreased with increase in ageing time and temperature. The highest value was obtained for sample solutionized at 1500C and aged for 6h. Open circuit corrosion potential (OCP) and potentiodynamic polarization (PDP) measurements were used to study corrosion behavior. High corrosion rate was observed for the sample aged at 1500C for 10h and less for the sample aged at 1750C for 12h. The results showed that the effect of ageing temperature on corrosion behavior in 3.5% NaCl solution is not consistent for different ageing times. The composite aged for 6h showed superior wear resistance irrespective of temperature. Maximum wear resistance was obtained by ageing at 1750C due to less volume fraction of intermetallic phases and less agglomeration of SiC particles.



Biography:

Dr. Rupendra M. Anklekar is presently working as Professor in Mechanical Engineering Department at Alamuri Ratnamala Institute of Engineering and Technology which is affiliated to the University of Mumbai. He is also Dean - R&D focusing on developing an excellent R&D Center by working with industries and Government agencies. With 20+ years of R&D experience in industry, he has carried out extensive research and developed new material processes for various high-tech equipments. He has 10+ years in academia carrying out teaching and research and worked as Research Faculty and Post-Doctoral Scholar at Pennsylvania State University, USA for 3 years. He has been awarded B.Tech., M.Tech. and Ph.D. degrees in Metallurgical Engineering & Materials Science from the premier institute IIT Bombay. He has published 78 peer reviewed technical papers in reputed International Journals and Conference Proceedings and authored 5 Patent Applications in India, USA and Taiwan as an Inventor.

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