

**Materials Congress 2018: Effect of Ageing on Microstructure, Corrosion and Wear Behavior of Stir Cast Al7075/SiC MMC - Dr. Rupendra Anklekar -India**

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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 125 $\mu$ m 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.

Advanced Materials Science and Nanotechnology is a broad, diverse and multidisciplinary field. It is continuous interaction with basic disciplines and is also contributing to meet all Grand Societal Challenges. This contribution is such that numerous reports have been produced in recent years in Asia and world - wide, with the aim of drawing a comprehensive picture and proposing coordinated actions towards the establishment of coherent strategies in the field. The present report subscribes to this perspective, with a particular goal which is to contribute to the establishment of a comprehensive view of the role in efficient development of key enabling technologies. The worldwide market for carbon fibre came to \$1.8 billion in 2014, and further the market is relied upon to develop at a five-year CAGR (2015 to 2020) of 11.4%, to reach \$3.5 billion in 2020. Carbon fibre strengthened plastic market came to \$17.3 billion in 2014, and further the market is relied upon to develop at a five-year CAGR (2015 to

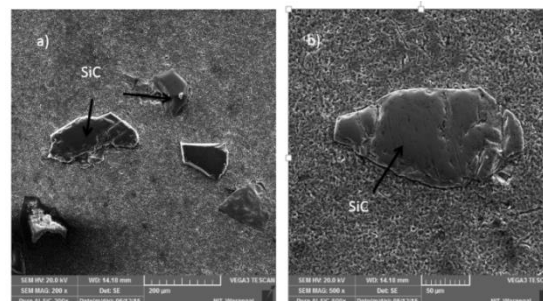
2020) of 12.3%, to reach \$34.2 billion in 2020. The opposition in the worldwide carbon fiber and carbon fiber strengthened plastic market is serious inside a couple of expansive players, for example, Toray Toho, Mitsubishi, Hexcel, Formosa, SGL carbon, Cytec, Aksa, Hyosung, Sabc. The global market for 3-D printing materials reached \$475.4 million in 2015. This market is expected to reach \$576.6 million in 2016 and over \$1.5 billion in 2021, registering a compound annual growth (CAGR) of 21.5% over the next five years. Photopolymers, the largest segment of the global market for 3D printing materials, should reach \$334.6 million in 2016 and \$711.8 million by 2021, increasing at a CAGR of 16.3% through 2021. Ascend popular from the end client ventures drives the composites showcase. Enhanced properties, for example, high weakness life, high quality and modulus, diminished weight, acoustic protection, and erosion resistance have prompted to an expansion in the request. Unpredictability in the crude material costs, and non-recyclable nature of composites represent an extraordinary risk in the development of the market. MSE staffs are driving various research ventures, which are bolstered by a normal of \$4-5 million every year. A noteworthy segment of this subsidizing originates from government stipends: U.S. Division of Defense and all branches of the military, U.S. Bureau of Energy, National Science Foundation, and Center for Disease Control and Prevention. Another part originates from State or private establishments. Nanotechnology's potential still remains un-used, interest in the field is blasting. The U.S. government conveyed more than a billion dollars to nanotechnology inquire about in 2005 to discover new advancements in nanotechnology. China, Japan and the European Union have spent comparative sums. The trusts are the same on all fronts: to inspire oneself off a surface on a developing worldwide market that the National Science Foundation appraisals will be justified regardless of a trillion dollars. The worldwide

market for enacted carbon totaled \$1.9 billion. Today, many materials chemists are synthesizing functional device materials, and the discipline is often seen as directed towards producing materials with function—electrical, optical, or magnetic. Material chemistry is involved in the designing and processing of materials. Global market for catalysts is expected to reach \$28.5 billion by 2020, growing at a CAGR (2015 to 2020) of over 3%. Asia-Pacific is having the largest market for catalysts accounting for more than 35% share.

At long last, industry (from little new businesses to vast universal partnerships) gives a significant part of the rest of, which give both to graduate research assistantships and support for students leading exploration on a venture. 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 150°C 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 150°C for 10h and less for the sample aged at 175°C 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 175°C due to less volume fraction of intermetallic phases and less agglomeration of SiC particles

these 2 procedures in the largest series of lengthening surgeries published. There were 66 patients (43 Bianchi and 34 STEP). Survival was 91% and weaning from PN in 60% with no differences between the procedures. Although, intestinal transplantation has now become clinically successful, intestinal lengthening remains a viable alternative in many patients with IF and avoids the need for life-long immunosuppression, with its attendant risks.

## Image



**Fig-1: SEM Images of 7075Al-6%SiC Stir Cast composite (a) 200X, (b) 500X.**

## Recent Publications

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3. Mousavi Abarghouie, S. M. R., Seyed Reihani, S. M. (2010). “Aging behavior of a 2024 Al alloy–SiCp composite”, Materials and design, Vol. 31, No. 6, pp. 2368-2374, ISSN 02613069
4. Li Jin-feng, Peng Zhuo-wei, Li Chao-xing, Jia Zhi-qiang, Chen Wen-jin and, Zheng Zi-qiao “Mechanical properties, corrosion behaviors and microstructures of 7075 aluminium alloy with various aging treatments,” Vol. 18, No. 4, (2008):755-762.
5. Mamatha G.P., Pruthviraj R.D. and Ashok S.D., “Weight loss corrosion studies of aluminium - 7075 metal matrix composites reinforced with SiC particulates in HCl solution,” International Journal of Research in Chemistry and Environment (2011):85- 88.