(“Nano Structured Surface")

Soft Competing Technique in Nano-Technology to Improve the Thermal Mechanical Properties for Aluminum-Silicon Alloy

Nazia Tarranum1, M. Ayaz Ahmad2, Alveera Khan3 N. Sarikavakli4

1 Transfer Technology Department, Institute of Physics, Natl. Acad. of Sci. of Ukraine. Prospect Nauki, 46, Kiev-03039, Ukraine.
E-mail: email.of. corresponding_author@server.com

1 Department of Chemistry, Chaudhary Charan Singh University - Meerut 200005, India.E-mail: naz1012@gmail.com
2 Physics Department, Faculty of Science, P. O. Box 741, University of Tabuk, 71491, Saudi Arabia, E-mail of. Corresponding author: mayaz.alig@gmail.com
3 Physics Department, Motilal Vighyan Mahavidhyalaya, Bhopal, India, E-mail: khanalveeera@gmail.com
4Department of Chemistry, Faculty of Sciences and Arts, Adnan Menderes University, 09010-Aydin, Turkey, E-mail: nsarikavakli@adu.edu.tr

In this article an attempt has been made for the study experimentally and theoretically using by artificial intelligence (AI) technique to improve the thermo-mechanical properties for Aluminum–1wt.% Silicon alloy [1-5]. The alloys (Al-Si) have considerable importance in aluminum cables industry, because of their low density and relatively high electrical conductivity. The Al-1wt.%Si wires were used extensively in the semiconductor industry for making interconnections between the semiconductor devices and the package in which it is encased [6-9]. These interconnections are achieved by plastically deforming the wires and the metallization either by the application of temperature and pressure or ultrasonic energy and pressure. The wire bond can subsequently experience mechanical shock and cyclic stress during processing and operation. Hence, the thermo-mechanical properties of these alloys will determines to considerable degree the integrity of bond formation [10-14]. Both strength and ductility of the Al-Si alloys were observed to be functions of the size and distribution of the silicon particles in the aluminum matrix. Alloys are prepared by normal cast then investigate by transmission electron microscope (TEM). All specimens were solution heat treated for 3h at 823K, and then quenched in water kept at room temperature . Some of specimens were irradiated with integrated doses of gamma rays up to 1.75 MGy. Tensile creep tests were carried out under constant suitable stress. All data and results discuss in view beast thermo-mechanical properties of alloys. Artificial Intelligence techniques involving neural networks become vital modeling tools where model dynamics are difficult to track with conventional techniques. AI

techniques of artificial neural networks (ANN) have recently been used to design and implement more effective models. It is used to simulate the thermal mechanical module. It also, predicts some of the best characteristics of this sample to help in the use of the industry. The results are discussed in the scope of the previous theories and physical access to reach the best thermo-mechanical properties of aluminum – Silicon alloys.

References

1. *S. Abis, G. Onofrio*, Proceeding of Advanced Materials, Milano, Italy, (1989) 511.
2. A.M. Abd El-Khalek; Materials Science and Engineering A 500 (2009) 176–181.
3. F. Abd El-Salam, R.H. Nada, A.M. Abd El-Khalek, S.M. Abdou, AMSE 74 (2) (2001) 31.
4. F. Abd El-Salam, A.M. Abd El-Khalek, R.H. Nadaa, L.A. Wahab, H.Y. Zahran; Materials Science and Engineering A 527 (2010) 1223–1229.
5. A.M. Abd El-Khalek; Physica B, 315 (2002) 7–12.
6. F.Abd EI-Salam, M.R. Nagy; Proc. Math. Phys. Soc. Egypt, 47, (1979)179–185.
7. M.H.N. Beshai, G.H. Deaf, A.M. Abd El-Khalek, G. Graiss, and M.A. Kenawy; Phys. Stat. Sol. (a) 161 (1997) 65–72.
8. P. Van Mourik, Th.H. Dekeijeser, E.J. Mittemeijer; Scripta Metall., 21 (1987) 361–367.
9. A.M. Abd El-Khalek and F. Abd El-Salam; Radiation Effects & Defects in Solids 163, 10, (2008) 835–842.
10. G.H. Deaf, M.H.N. Beshai, A.M. Abd El-Khalek, G. Graiss, M.A. Kenawy, Cryst. Res. Technol. 32 (1997) 3.
11. A. Gaber, N. Afify, M.S. Mostafa; J. Phys. D 23 (1990) 1119.
12. R.V. Nandedkar, A.K. Tyagi; In Metallic Glasses; T.R. Anantharaman, Ed. Trans. Tech. Pub. (1984) 165–174.
13. M.Y. El-Bakry, A. Moussa, A. Radi, E. El-dahshan, M. Tantawy, Int. J. Sci. Eng. Res. 3 (8) (2012) 15–21.
14. M.Y. El-Bakry, A. Moussa, A. Radi, E. El-dahshan, D.M. Habashy, G.Abbas Ehab, Int. J. Sci. Eng. Res. 1 (2) (2012) 5–11.