DOI 10.1007/s11015-023-01460-0

Metallurgist, Vol. 66, Nos. 11-12, March, 2023 (Russian Original Nos. 11-12, November–December, 2022)

EFFECT OF CHEMICAL COMPOSITION ON THE CORROSION RESISTANCE, MICROSTRUCTURE, HARDNESS AND ELECTRICAL CONDUCTIVITY OF THE Ge–In–Sn ALLOYS

M. Zečević,[1] N. Tosković,[2] A. Djordjević,[3] D. Minić,[4] D. Tošković,[5] M. Kolarević,[6] V. Ristic,[7] and Ž. Tasić[8]

UDC 541.1

This paper presents the results of experimental and analytical testing of the ternary Ge–In–Sn system. Experimental part includes results of the corrosion resistance, microstructure, hardness and electrical properties of the selected ternary Ge–In–Sn alloys. The prepared alloys were tested using X-ray powder diffraction (XRD) method, scanning electron microscopy with energy dispersive spectrometry (SEM-EDS), hardness and electrical conductivity tests. For the obtained values of hardness and electrical conductivity, a mathematical model was used in order to determine the properties of the alloy in the entire range of the composition. The results of the Brinell hardness test show that the $Ge_{80}In_{10}Sn_{10}$ ternary alloy has the highest hardness of all tested ternary alloys, 254.2 MN/m^2. While, results of the electrical conductivity test show that the $Ge_{10}In_{10}Sn_{80}$ ternary alloy has the highest conductivity of all tested ternary alloys and the highest corrosion resistance. Calculated isothermal section at 25°C, were confirmed with XRD and EDS results.

Keywords: Ge–In–Sn system, corrosion resistance, hardness measurement, electrical conductivity measurement, mathematical model.

[1] University of Prishtina in Kosovska Mitrovica, Faculty of Technical Science, Department of Technological engineering, Serbia; e-mail: milena.premovic@gmail.com.

[2] Elixir Group, Hajduk Veljkova 1, Šabac, Serbia.

[3] University of Prishtina in Kosovska Mitrovica, Faculty of Technical Science, Department of Technological engineering, Serbia.

[4] University of Prishtina in Kosovska Mitrovica, Faculty of Technical Science, Department of Technological engineering, Serbia.

[5] University of East Sarajevo, Faculty of Technology, Bosnia and Herzegovina.

[6] University of Kragujevac, Faculty of Mechanical Engineering in Kraljevo, Serbia.

[7] University Union-Nikola Tesla, Faculty of Engineering Management, Belgrade, Serbia.

[8] University of Belgrade, Technical Faculty Bor, Serbia.

Translated from Metallurg, Vol. 66, No. 11, pp. 95–106, November, 2022. Russian DOI 10.52351/00260827_2022_11_95. Original article submitted June 20, 2022, after modification August 16, 2022, received for publishing September 2, 2022.

 0026-0894/23/1112-1452