

Influence of selected microadditives on the properties of cold-worked magnesium copper alloy

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Abstract

Statement of the Problem:

The article contains the results of the influence of microadditions P, Al, Ti, Zr on the properties after cold rolling of magnesium copper. The samples were obtained by static casting into rods with a diameter of 20 mm. The castings obtained were deformed on a cold rolling with identical drafts. At the deformation level of 57.2, 76.9 and 91.3%, their mechanical properties were tested. In addition, electrical conductivity and structure were tested after final deformation. The conducted tests proved the influence of the applied microadditives on all the tested parameters.

Conclusion & Significance: A large influence of microadditives on the final properties of castings after plastic working (the rolling process) was found. Depending on the amount of microadditives and their type in rolled castings, various values of material properties were obtained and the following conclusions were formulated:

– The technology presented in the article allows to get selected good quality magnesium copper-based wire rods obtained in the static casting process.

– Wire rod number 3 with the composition of 0,025 % Al, 0,83 % Mg, and Cu the rest has the highest hardening level after applying the total draft of 91,3 % (the highest coefficient $R_m = 580$ MPa), while the lowest ($R_m = 421$ MPa) occurs in wire rod number 1 with a mass chemical composition of 0,009 % Al, 0,023 % Mg, and Cu the rest.

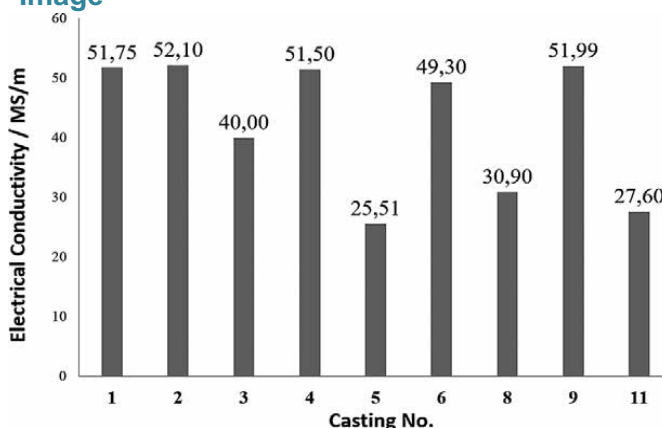
– The highest mechanical properties were recorded in the sample containing the highest content of magnesium and the addition of Al in the amount of 0,025 % by mass. (casting No. 3) it caused an increase in the R_m coefficient to 580 MPa with a simultaneous decrease in elongation to 1,6 %. The electrical conductivity has also been reduced to 40 MS/m.

– The presence of Ti together with Al (wire rod 5) and Al and P (wire rod 8 and 11) as well as Al alone (wire rod 3) causes a decrease in electrical conductivity.

Additional information

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Image



Electrical conductivity depending on chemical composition, total draft 91,3%.

Recent publications

- Kołacz D, Radoń A, Krukowski K, Kulasa J, Kolano-Burian A (2023) Use of HIP Process in Post-Processing of Components Manufactured by SLM Technology from Magnetically Soft FeSi6. 5 Powder. Hot Isostatic Pressing: HIP'22 38, 61.
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- Kołacz D, Kulasa J, Krukowski K, Hury A, Muzia G, Osadnik M, Kalabis J (2023) Effect of sintering temperature and isostatic pressure on selected properties of selected electrical contact materials manufactured by hot isostatic pressing. *Composites Theory and Practice* 23.
- Jóźwik B, Radoń A, Topolska S, Kalabis J, Karpiński M, Burian W, Kołacz D, Polak M, Brudny A, Łoński W, Kolano-Burian A (2023) Influence of SLM printing parameters and hot isostatic pressure treatment on the structure and properties of CuNi3Si1 alloy. *Journal of Alloys and Compounds* 947, 169531.
- Kołacz D, Księżarek S, Borkowski P, Karwan-Baczewska J, Lis M (2019) The Influence of mechanical alloying and plastic consolidation on the resistance to arc erosion of the Ag–Re composite contact material. *Materials* 14 (12), 3297.

Photograph



Biography

Dr technologist and employee managing the production of contact materials at ZPM INMET in Gliwice. From 2019, he worked as an assistant at the I-IMN Metals and Alloys Processing Plant. Carrying out research on metal fabrication and processing and their alloys by mechanical and physico-mechanical methods. He participated in national projects International. Author and co-author of 28 publications, 2 patents and 7 patent applications.

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