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JEDANAESTI SIMPOZIJUM O TERMODINAMICI I FAZNIM DIJAGRAMIMA

sa međunarodnim učešćem

ZBORNIK IZVODA RADOVA

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Jedanaesti simpozijum o termodinamici i faznim dijagramima

Izdavač:
Fakultet Tehničkih nauka
Kneza Miloša br.7, 38220 Kosovska Mitrovica
Tel/Fax: (+381 28) 425-320 / 425-322
office@ftn.pr.ac.rs

Za izdavača:
Dekan,
Prof. dr Srđan Jović

Urednik:
Prof. dr Duško Minić

Kompjuterska obrada:
Doc. dr Aleksandar Đorđević

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Microstructural analysis and hardness of some tin bronzes alloyed with Zn or/and Pb

Ivana Marković, Uroš Stamenković, Dragan Manasijević, Ljubiša Balanović

University of Belgrade, Technical Faculty in Bor, VJ 12, Bor, Serbia

Abstract

Tin bronzes have wide applications due to their high hardness and strength, resistance to corrosion and wear. Lead is added to these alloys to increase the density and therefore hermeticity, to improve machinability and anti-friction properties. Zinc increases the mechanical properties of tin bronzes, and raises the flow and hermeticity of ingots due to the reduction of gases content. The alloys' microstructure influences all listed properties, therefore the analysis by microscopic methods is an essential technique to investigate their state and influence on different properties [1-5].

For this purpose, CuSn8Zn4, CuSn10Pb5, and CuSn5Zn5Pb5 alloys (with similar content of alloying elements) were prepared by casting. Microstructures of these ingots were investigated using optical and scanning electron microscopy (SEM) with energy-dispersive spectroscopy (EDS) while the hardness was measured using a Vickers tester. Microstructural characterization of all investigated alloys showed segregated α solid solution and α + δ eutectoid within Pb rich phase but with different content of presented phases which influenced significant differences in hardness values (80 HV10 - 115 HV10).

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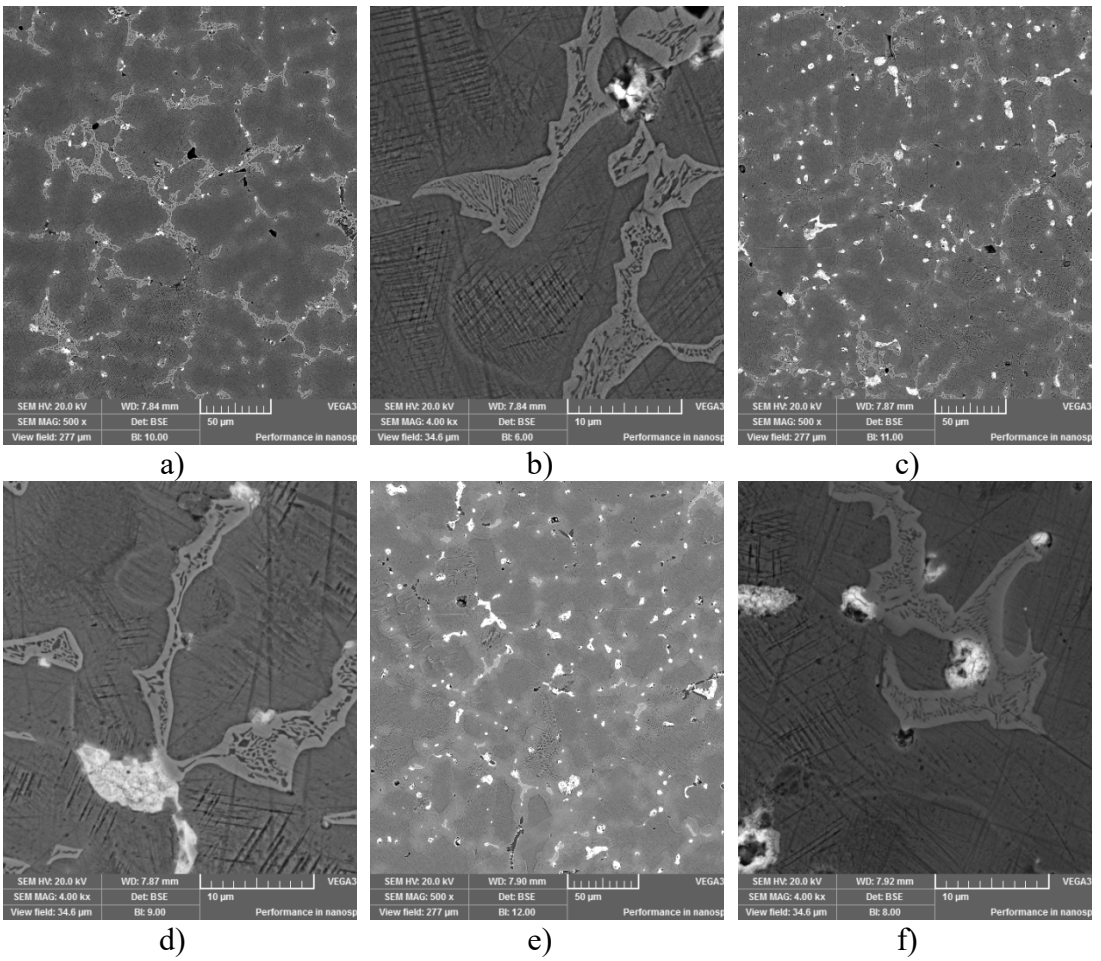
Graphical abstract:



Microstructures of investigated alloys: a) CuSn8Zn4 magnification 500x, b) CuSn8Zn4 magnification 4000x, c) CuSn10Pb5 magnification 500x, d) CuSn10Pb5 magnification 4000x, e) CuSn5Zn5Pb5 magnification 500x and f) CuSn5Zn5Pb5 magnification 4000x.