

Komitet za termodinamiku i fazne dijagrame Srbije

u saradnji sa:

Fakultetom tehničkih nauka u Kosovskoj Mitrovici,

Tehničkim fakultetom u Boru i

Associated Phase Diagram and Thermodynamics Committee
(Poland, Czech Republic, Hungary, Bulgaria, Slovenia, Serbia,
Montenegro, Romania, Croatia, Bosnia and Herzegovina)

DVANAESTI SIMPOZIJUM O TERMODINAMICI I FAZNIM DIJAGRAMIMA

sa međunarodnim učešćem



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**Kosovska Mitrovica,
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Dvanaesti simpozijum o termodinamici i faznim dijagramima

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Dvanaesti simpozijum o termodinamici i faznim dijagramima

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Microstructural and thermal properties of the Al-Cu eutectic alloy

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Abstract

Understanding thermal characteristics such as thermal conductivity, specific heat capacity, and latent heat of fusion is crucial when developing phase change materials (PCMs) for latent heat energy storage (LHES) systems [1]. Among metal-based PCMs, aluminum-based eutectic alloys have emerged as some of the most extensively studied due to their favorable thermal and mechanical properties [2]. In this study, the Al–33.6 mass% Cu eutectic alloy was investigated in terms of its microstructure, thermal diffusivity, thermal conductivity, specific heat, and latent heat of melting. Techniques including scanning electron microscopy (SEM), energy-dispersive spectroscopy (EDS), differential scanning calorimetry (DSC), and the light flash method were employed. Analysis revealed that the alloy's microstructure contains both fine and coarse (Al)+Al₂Cu eutectic phases. Measurements showed that specific heat, thermal diffusivity, and thermal conductivity all increase with temperature over the range of 25–400 °C. At room temperature, the alloy exhibits a thermal conductivity of 134.3 W·m⁻¹·K⁻¹. The latent heat of fusion was determined to be 319.5 J·g⁻¹. Overall, the findings highlight the strong potential of the Al–Cu eutectic alloy as a candidate material for use in phase change thermal energy storage applications.

Type of work: original research paper.

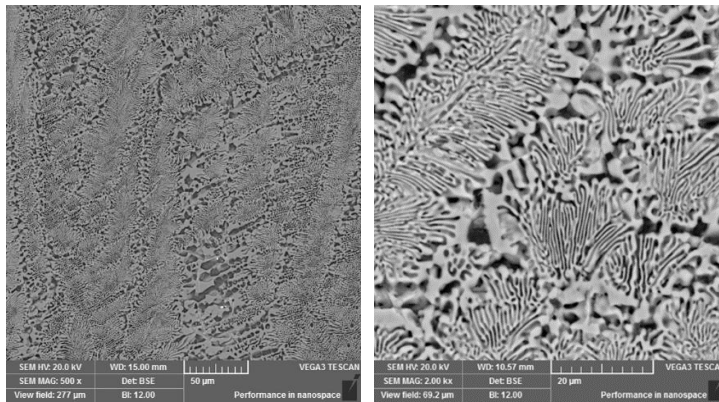
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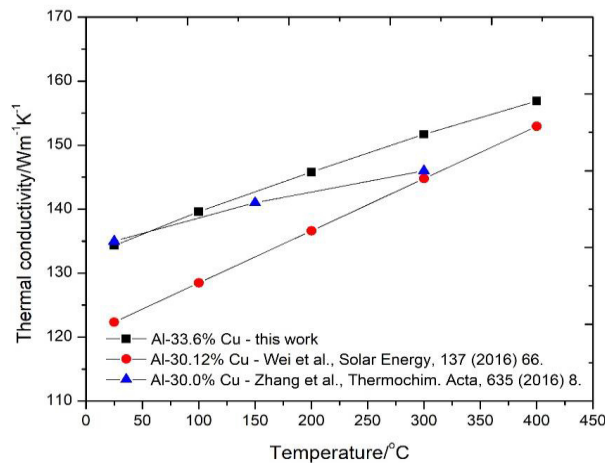
Graphical abstract:



(a)

(b)

*SEM image of the Al-33.6% Cu eutectic alloy:
(a) magnification 500x; (b) magnification 2000x.*



Thermal conductivity dependence on temperature for the investigated Al-33.6% Cu alloy with the literature data.