

Accepted Manuscript

Interfacial properties of Cu/Ni/Mg₂Si joints prepared in one step by the spark plasma sintering method

Ren Yao Yang, Shaoping Chen, Wenhao Fan, Xiufeng Gao, Yang Long, Wenxian Wang, Zuhair A. Munir

PII: S0925-8388(17)30509-1

DOI: [10.1016/j.jallcom.2017.02.082](https://doi.org/10.1016/j.jallcom.2017.02.082)

Reference: JALCOM 40810

To appear in: *Journal of Alloys and Compounds*

Received Date: 8 September 2016

Revised Date: 25 January 2017

Accepted Date: 9 February 2017

Please cite this article as: R. Yang, S. Chen, W. Fan, X. Gao, Y. Long, W. Wang, Z.A. Munir, Interfacial properties of Cu/Ni/Mg₂Si joints prepared in one step by the spark plasma sintering method, *Journal of Alloys and Compounds* (2017), doi: 10.1016/j.jallcom.2017.02.082.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



Interfacial Properties of Cu/Ni/Mg₂Si Joints Prepared in One Step by the Spark Plasma Sintering Method

Ren Yao Yang¹, Shaoping Chen^{1,2}, Wenhao Fan³, Xiufeng Gao¹, Yang Long¹, Wenxian Wang²,
and Zuhair A. Munir⁴

(1. Key Laboratory of Interface Science and Engineering in Advanced Materials, Ministry of Education, Taiyuan University of Technology, Taiyuan 030024, China. 2. College of Materials Science and Engineering, Taiyuan University of Technology, Taiyuan 030024, China. 3. College of Physics and Optoelectronics, Taiyuan University of Technology, Taiyuan 030024, China. 4. Department of Material Science and Engineering, University of California, Davis, CA 95616, USA.)

Abstract

Cu/Ni/Mg₂Si thermoelectric bonded joints were prepared in one step by the spark plasma sintering (SPS) method using Mg and Si powders to form Mg₂Si. The microstructure and elemental distribution across the interfaces were determined, and the formation of new phases at the interface was investigated and related to joint properties, including shear strength and contact resistance. Joint formation was accompanied by the formation of two ternary Mg-Si-Ni layers, an η -layer with Ni₂Si as a precipitate next to Ni, and an ω -layer next to Mg₂Si. The formation and characteristics of these layers played a major role in determining the shear strength and contact resistance. It was determined that a reactive sintering temperatures in the range 1023-1053K with a 15-20 min hold time provided the best properties. The maximum shear strength of the joints obtained is 26MPa for samples sintered at 1023K. For these samples the contact resistance was 1.44 m Ω •cm²; the minimum value of 1.28m Ω •cm² was measured for samples sintered at 1073K. Long-term thermal stability of joints was also investigated.

Keywords: Thermoelectric Materials; SPS; Magnesium Silicide; Shear Strength; Contact Resistance

Download English Version:

<https://daneshyari.com/en/article/5460026>

Download Persian Version:

<https://daneshyari.com/article/5460026>

[Daneshyari.com](https://daneshyari.com)