

Accepted Manuscript

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PII: S0925-8388(18)31125-3

DOI: [10.1016/j.jallcom.2018.03.255](https://doi.org/10.1016/j.jallcom.2018.03.255)

Reference: JALCOM 45485

To appear in: *Journal of Alloys and Compounds*

Received Date: 8 November 2017

Revised Date: 9 March 2018

Accepted Date: 20 March 2018

Please cite this article as: A.S. Rogachev, S.G. Vadchenko, A.S. Aronin, A.S. Shchukin, D.Y. Kovalev, A.A. Nepapushev, S. Rouvimov, A.S. Mukasyan, Self-sustained exothermal waves in amorphous and nanocrystalline films: A comparative study, *Journal of Alloys and Compounds* (2018), doi: 10.1016/j.jallcom.2018.03.255.

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Self-sustained exothermal waves in amorphous and nanocrystalline films: a comparative study

Rogachev A.S.^{1,2*}, Vadchenko S.G.¹, Aronin A.S.³, Shchukin A.S.¹, Kovalev D.Yu.¹, Nepapushev A.A.², Rouvimov S.⁴, Mukasyan A.S.⁴

¹*Institute of Structural Macrokinetics and materials Science Russian Academy of Sciences, Chernogolovka, Russia;*

²*National University of Science and Technology "MISIS", Moscow, Russia;*

³*Institute of Solid State Physics Russian Academy of Sciences, Chernogolovka, Russia;*

⁴*Department of Chemical and Biomolecular Engineering, University of Notre Dame, Notre Dame, USA*

*Corresponding author, e-mail: rogachev@ism.ac.ru

ABSTRACT

A comparative experimental study of self-sustained exothermal waves in electrodeposited amorphous antimony (Sb) films, quenched glassy copper-titanium (CuTi) alloy, and magnetron deposited multilayer nickel-aluminum (Ni/Al) films was accomplished using a single approach. It is shown that self-propagating thermal waves can be initiated in all three systems, which convert the amorphous or multilayer metallic structure into nanocrystalline materials. The normalized temperature-time profiles allow us to make a conclusion on the similarity of the processes, despite the diverse driving forces in the considered systems. Periodic microstructures, probably induced by thermal oscillations of the crystallization waves, were observed in Sb and CuTi samples and discussed from the viewpoints of theoretical models.

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