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ON THE MELTING THESHHOLDS OF FILM-SUBSTRATE SYSTEM IRRADIATED WITH A PULSED ELECTRON BEAM *

A.B. MARKOV, A.V. SOLOVYOV

Tomsk Scientific Center of the Siberian Branch of the Russian Academy of Sciences, Tomsk, Russian Federation

One of the most important predicted characteristics when modeling of temperature fields in targets irradiated with a pulsed electron beams is the melting threshold, i.e., the lowest value of the beam energy density at which the phase transformation of the material from the solid to the liquid phase occurs [1, 2]. For any homogeneous material, the melting threshold is a number. For the film-substrate system, this is already a functional dependence, since the film thickness *d* can vary (see Figure 1 [3]). It is clear that the substrate melting threshold gradually increases from the melting threshold of the homogeneous substrate material to infinity. The melting threshold of the film in the infinity tends to the melting threshold of the homogeneous film material. The relative positions of these curves can be different. They may [3] or may not [4] intersect, the melting threshold of the film may increase or decrease with increasing film thickness. All this depends on the ratio of the thermal properties of the film and substrate materials.

The paper analyzes the influence of the thermal properties of the film and substrate materials on the behavior of the functional dependence "melting threshold - film thickness" during irradiation with a LEHCEB. It is concluded that the key role in the behavior of dependences is played by the difference between the thermal conductivities of the film and substrate materials.

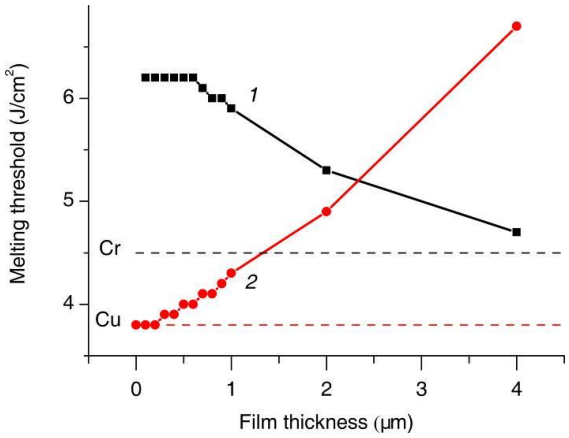

Fig.1. Melting thresholds of the film (1) and substrate (2) for the Cr (film)-Cu (substrate) system depending on the thickness of the Cr film.

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