Speckl dynamics method to study melting line of nickel monoaluminide

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We present a newly developed method for studying melting processes. Lasers produce stable speckle interference patterns on a surface. Phase transitions, such as melting, change it. The experimental setup combines a speckle-patterns visualization system with a multispectral camera and double acousto-optic imaging spectrometer. It allows simultaneous control of speckle-patterns dynamics [1] and temperature distribution in laser heating diamond anvil cell [2]. Such approach allowed to determine nickel monoaluminide (NiAl) melting line experimentally for the first time [3]. We show that the experimental points are slightly lower than those calculated using molecular dynamics by the one-phase and two-phase approaches. This research was performed with the financial support of the Ministry of Science and Higher Education of the Russian Federation (FFNS-2022-0008) The research was carried out using the unique scientific installation 'Laser Heating in DAC' in STC UI RAS [ID: 507563, https://unu.ntcup.ru].

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