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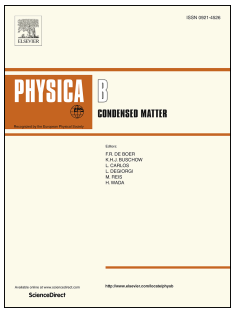

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A Theoretical Model of Grain Boundary Self-Diffusion in Metals with Phase Transitions (Case Study into Titanium and Zirconium)

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Abstract

The paper offers a model describing the process of grain boundary self-diffusion in metals with phase transitions in the solid state. The model is based on ideas and approaches found in the theory of non-equilibrium grain boundaries. The range of application of basic relations contained in this theory is shown to expand, as they can be used to calculate the parameters of grain boundary self-diffusion in high-temperature and low-temperature phases of metals with a phase transition. The model constructed is used to calculate grain boundary self-diffusion activation energy in titanium and zirconium and an explanation is provided as to their abnormally low values in the low-temperature phase. The values of grain boundary self-diffusion activation energy are in good agreement with the experiment.

Keywords: grain boundary diffusion, phase transitions, titanium, zirconium.

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