



CONFERENCE ABSTRACTS

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Deformation tensor for BCC-HCP martensitic transformation in TiZr shape memory alloy

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Today shape memory alloys (SMA) are frequently used in various fields of technology and medicine due to their unique properties. The most frequently used SMA is the titanium nickelide alloy (TiNi). However, stricter requirements for medical devices have led to the need to replace potentially carcinogenic nickel in titanium based SMA with other elements such as zirconium, molybdenum etc. The TiZr alloy can be called a high-strength and biocompatible alternative to titanium. This alloy has a high creep resistance at high temperatures and excellent corrosion resistance.

For effective use of SMA in various applications models are needed which allow correctly calculate the deformation of these materials. One of the most important material constants of the microstructure model [1] used in this work is the strain tensor of the crystallographic lattice transformation of the initial high-temperature austenitic phase into a low-temperature martensitic one. In this paper, the strain tensor matrix for BCC \leftrightarrow HCP martensitic transformation in the TiZr alloy was calculated. It was assumed that the transformation is performed by shear on the $\{112\}_{\text{BCC}}$ plane in the direction of $[111]_{\text{BCC}}$ and subsequent atomic shuffle. The deformation gradient and the matrix of Green-Lagrangian deformation tensor were calculated. The deformation tensor matrix was used to model the functional and mechanical properties of this material. The crystallographic resource for this transformation was estimated as the maximum value of the principal strains. The orientation of a single crystal providing the value of strain that is close to the calculated value of the crystallographic resource during realization of the pseudoelasticity effect was found.

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CERTIFICATE

We confirm that ***Rebrov Timofey*** has participated in the International Student Conference “Science and Progress-2020” organized by German-Russian Interdisciplinary Science Center at Saint-Petersburg State University and has presented the report entitled ***Deformation tensor for BCC-HCP martensitic transformation in TiZr shape memory alloy***

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