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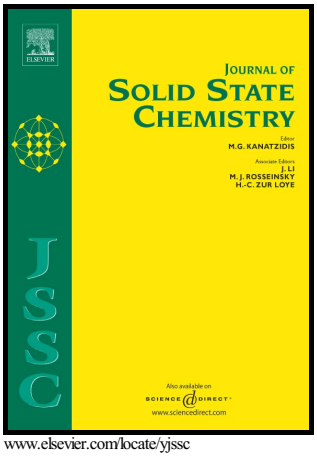

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Structural analysis and martensitic transformation in equiatomic HfPd alloy

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ABSTRACT

We investigated the crystal structure and the martensitic transformation in equiatomic HfPd alloy. The analysis of the crystal structure by electron diffraction and Rietveld refinement using X-ray diffraction data indicates that the space group of the martensitic phase is *Cmcm*, and the lattice parameters are a = 0.329 nm, b = 1.021 nm, and c = 0.438 nm. Martensitic variants are composed of the plate-like morphology of several hundred nm, and the boundaries between the variants have $(021)_{Cmcm}$ twin relations. This $(021)_{Cmcm}$ twin boundary seems to be sharp without ledge and steps. Differential scanning calorimetry measurement indicates that each martensitic transformation temperature is determined to be M_s = 819 K, M_f = 794 K, A_s = 928 K, and A_f = 954 K. Based on the dimension change using a thermo-mechanical analyzer, the expansion and shrinkage of the sample occurred with the forward and reverse martensitic transformation, respectively.

Graphical abstract

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