



## On the growth and mechanical properties of non-oxide perovskites and the spontaneous growth of soft metal nanowhiskers

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Shaker Verlag Mai 2013, 2013. Buch. Condition: Neu. Neuware - It has previously been suggested based on ab initio calculations that perovskites with the general formula of  $AB_3X$ , where A and B are metals, and X is B, C, or N, may exhibit unique mechanical properties such as superior ductility, and hence damage tolerance. In the first part of this thesis, the mechanical behavior of ternary perovskite borides and iron based perovskite nitrides is explored.  $YPd_3B$ ,  $Fe_4N$ ,  $ZnFe_3N$ , and  $PdFe_3N$  thin films were synthesized by combinatorial magnetron sputtering, and the mechanical properties thereof were probed by nanoindentation. Generally, the measured elastic moduli were in good agreement with ab initio data. The evaluation of the critical shear stress for the onset of plasticity suggests that  $YPd_3B$ ,  $Fe_4N$ , and  $PdFe_3N$  can be classified as ductile materials, which is also consistent with the prediction from ab initio calculations. The second part of the work demonstrates a possible application of the combinatorial thin film approach for the fabrication of one-dimensional nanostructured materials. In-Y thin films with a compositional spread were deposited by combinatorial magnetron sputtering. It was found that Inwhiskers were extruded spontaneously from the film surface upon exposure to atmosphere. In-whisker growth was...



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