

Study of thermodynamic behavior and thermal stability of advanced thermoelectric materials

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Doped skutterudites and Half-Heuslers alloys attract attention for their use as thermoelectric materials, possessing a high figure of merit, ZT . In this work the thermal and phase stability of various thermoelectric materials, prepared by ball milling, hot pressing and high pressure torsion or by their combinations, with high ZT values, have been studied via thermal analysis and the Knudsen effusion condensation method. The results from evaporation of volatile elements are presented. The information, supported by microstructure investigation and measurement of diffusion profiles, is summarized and the long-term operation stability of the studied bulk and nano-structured thermoelectric were evaluated. Long term stability evaluation is supported by in-situ electron microscopy at high temperatures. This approach allow us to evaluate sublimation processes in the thermoelectric materials at high temperatures.