A thermally robust transverse thermoelectric

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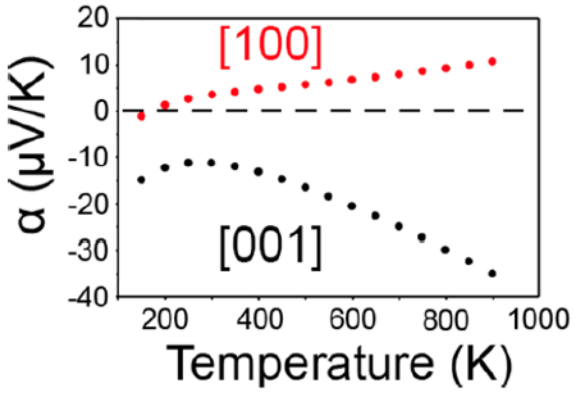
Materials that demonstrate axis-dependent conduction polarity enable new technologies by integrating p- and n-type functionality into a single crystal. One example is the transverse thermoelectric, in which difficult to fabricate alternating pillars of n- and p-type doping are replaced with a single material.

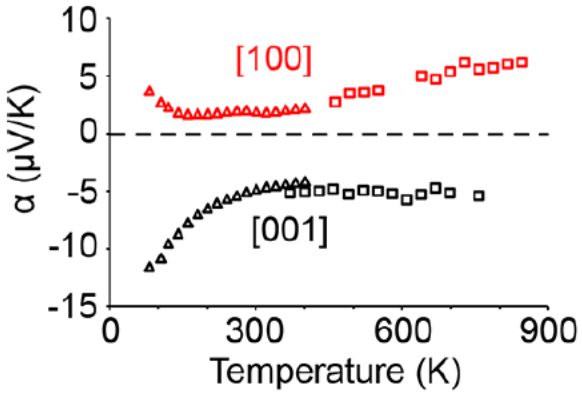
Users from The Ohio State University theoretically predicted axis-dependent conduction polarity in tetragonal α-WSi_2—a durable, thermally robust, and oxidation-resistant metal synthesized from earth-abundant elements. **Two single crystals of α-WSi_2 were prepared at PARADIM's Bulk Crystal Growth Facility** using floating zone techniques, and their anisotropic conduction properties were evaluated. Simultaneous positive and negative thermopowers measured along the [100] and [001] directions, respectively, indicate that this material exhibits axis-dependent conduction polarity, which closely matches **theoretical predictions**.

K.G. Koster, et al. *Chem. Mater.* **35**, 4228-4234 (2023).

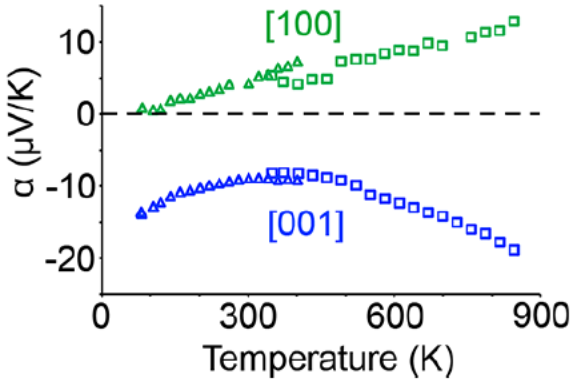
Prediction



Crystal 1



Crystal 2



(top) Calculated thermopowers at $E - E_f = 0$ as a function of temperature. (right) Thermopowers of single crystals 1 and 2 of WSi_2 as a function of temperature, measured along both the [001] (black, blue) and [100] (red, green) directions.