

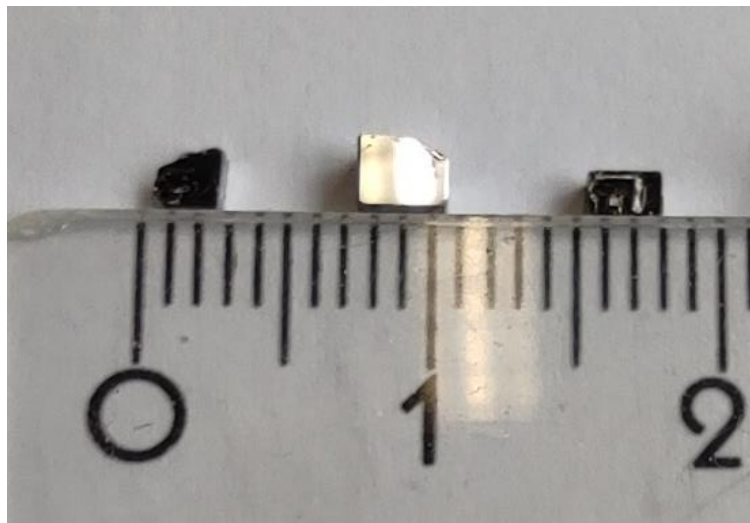
Research topic for Bachelor thesis, ARL and master thesis

Growing single crystals by the flux method

A single crystal, defined as a material consisting of continuous repetition of the unit cell in three dimensions, has no grain boundaries except the surface. The absence of the defects related to grain boundaries offers single-crystal unique properties. For instance, depending on the type of crystallographic structure, thermal and electrical transport properties can be highly anisotropic[1]. Besides, a single crystal is desirable to probe a clear picture of a material's intrinsic properties. There are many methods for growing a single crystal: Bridgman technique[2], Solution/flux growth [3], etc.

This project aims to

- 1) grow half-Heusler NbCoSn and ZrNiSn single crystals with different compositions by flux method, and their intrinsic thermal and electrical properties will be investigated. (2 students)
- 2) grow $\text{Fe}_2(\text{P},\text{Si})$ single crystals with different compositions by flux method, and their intrinsic magnetic properties will be investigated. (2 students)



NiS₂ crystals grown by Te flux method (photo credit, Wenjie Xie)

[1] L. D. Zhao, et al., Nature 508, 373-377 (2014).

[2] P. W. Bridgman. Proceedings of the American Academy of Arts and Sciences. 60 (6): 305-383.

[3] P. C. Canfield & Z. Fisk, Philosophical Magazine B, 1992, 65 (6), 1117-1123

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