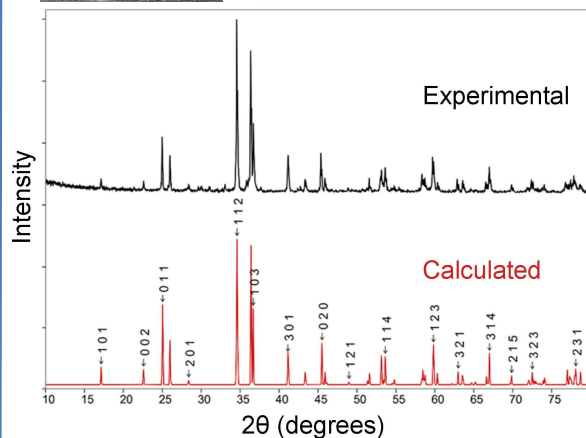
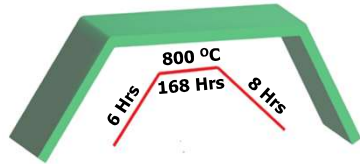


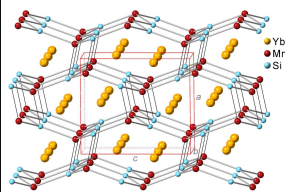
Background

Ytterbium-based manganese germanide and silicide (YbMnGe and YbMnSi) are very interesting intermetallic compounds. For instance, the 1-1-1 stoichiometric ratio YbMnGe high temperature (HT) phase adopts a ZrNiAl-hexagonal structure while a low temperature (LT) phase adopts a TiNiSi-orthorhombic structure. Like the LT YbMnGe, YbMnSi adopts a stable TiNiSi structure at all temperatures. More importantly Yb adopts variable oxidation states which are important in the magnetic properties of Yb-based intermetallic compounds, in that, Yb²⁺ shows no magnetic moment whereas Yb³⁺ is magnetic. In this research, we report for the first time the magnetic properties of YbMnSi, this compound shows antiferromagnetic ordering at Neel temperature (T_N) = 303 K due to Mn moment and an anomalous magnetic behavior at low temperature around 13 K, we assigned this low-temperature behavior to Yb moment. X-ray absorption spectrum confirms Yb to be +3 oxidation state which is a magnetic form of Yb. Rietveld refinement on x-ray diffraction data shows that YbMnSi conforms to TiNiSi-orthorhombic structure similar to what was reported in the literature. In the future, we plan to uncover the magnetic structure of YbMnSi using the neutron diffraction technique, also, we plan to research how chemical substitution and doping could influence the magnetic structure of YbMnSi.

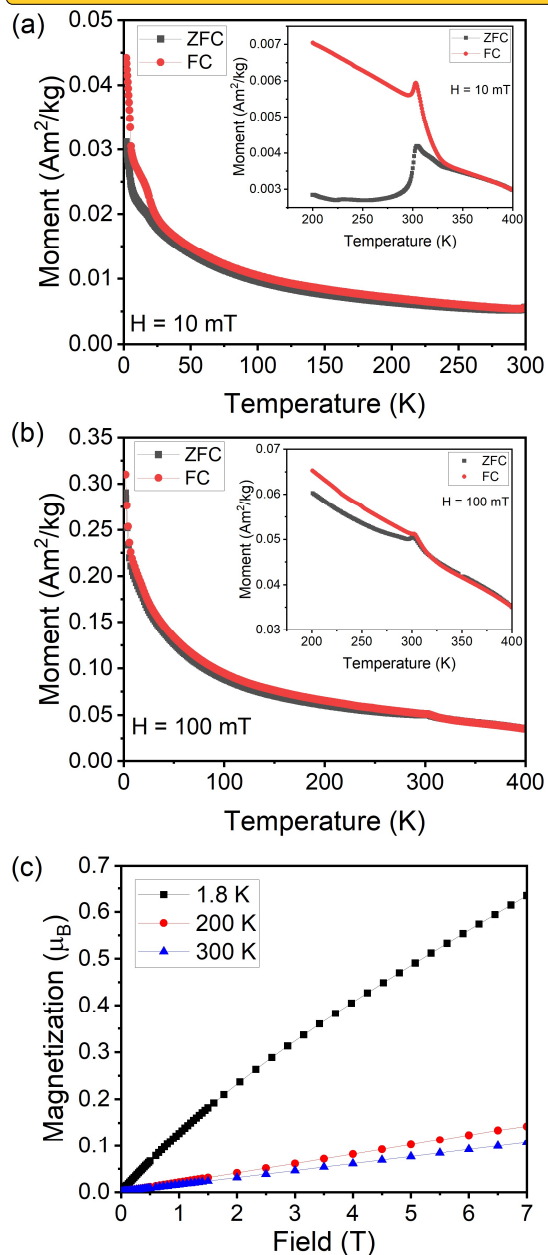
Synthesis and Crystal Structure



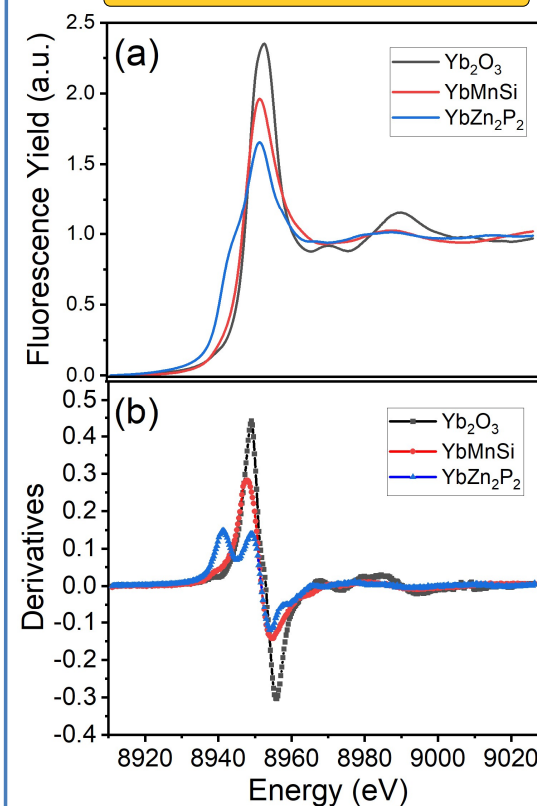
	YbMnSi (this work)	YbMnSi
SG	Pnma	Pnma
a, Å	6.851(2)	6.850(1)
b, Å	3.994(1)	3.982(1)
c, Å	7.857(2)	7.863(1)
Volume, Å³	214.96	214.5



Magnetic Properties of YbMnSi



X-ray Absorption Spectra of YbMnSi



Conclusion

- YbMnSi was synthesized from a stoichiometric combination of Yb, Mn, and Si in 1-1-1 ratio in a Niobium crucible
- Magnetic properties show high-temperature AFM due to Mn at T_N = 303 K.
- Low-temperature magnetic ordering shows anomalous magnetic behavior due to the Yb moment around 15 K.
- X-ray Absorption spectra unambiguously show Yb exhibits a +3-oxidation state rather than a +2-oxidation state

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