

PCP2-3

Intercalation of alkaline earth metals and rare-earth ions into 2H-NbSe₂

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The intercalation of alkali and alkaline earth metals with liquid ammonia or organic solvents into the FeSe superconductor results in a significant increase in the superconducting transition temperature (T_c). [1,2] Although the mechanism of the increase of T_c has not been known, this study indicates that intercalation with liquid ammonia or organic solvents is a technique effective for increasing T_c . Meanwhile, transition metal dichalcogenide compounds (TMDC) are known to have the layered structure which resembles that of FeSe. In particular, 2H-NbSe₂, one of TMDC, exhibits superconductivity below 7 K [3] and can be a material suitable for the intercalation. In this study, we report on the synthesis of $(\text{NH}_3)_y\text{A}_x\text{NbSe}_2$, where A is an alkaline earth metal element or Yb (x is a nominal value), by intercalating alkaline earth metals into NbSe₂ with liquid ammonia as a solvent. We also present the synthesis of $(\text{C}_2\text{H}_8\text{N}_2)_y\text{A}_x\text{NbSe}_2$ by the ethylenediamine ($\text{C}_2\text{H}_8\text{N}_2$) solvent. Physical properties of intercalated samples were measured. Magnetization of the samples indicates that all the samples exhibit superconductivity and different T_c values. Powder x-ray diffraction patterns (Fig. 1) show changes in the c -axis associated with intercalation for the samples. We discuss a relation between T_c and the c -axis length. Its implication in charge-density-wave is also discussed. The details will be explained in the presentation.

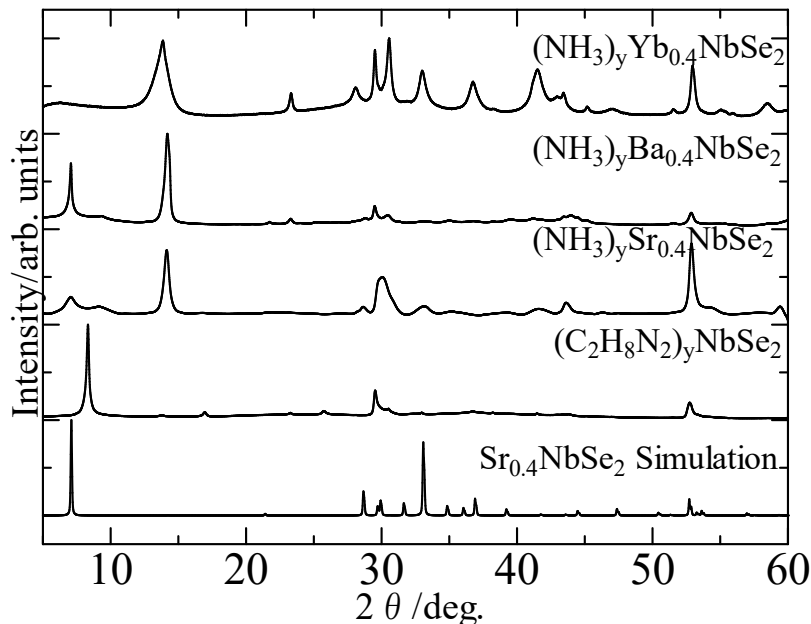


Fig. 1 Patterns of powder x-ray diffraction for samples

- [1] T.P.Ying et al., Sci. Rep. 2 (2012) 426.
- [2] T. Hatakeda et al., J. Phys. Soc. Jpn. 82, 123705 (2013)
- [3] E. Morosan et al., Nature Phys. 2, 544 (2006).