層状半導体 InSe の低温液相成長と光学特性

The low temperature liquid phase growth of layered semiconductor InSe

and its optical properties

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Two-dimensional (2D) materials, including InSe and GaSe have attracted more and more attentions nowadays. The high quality InSe crystals have been successfully grown by the temperature difference method under controlled vapor pressure (TDM-CVP), in which the crystals can be prepared at the temperature far lower than their melting point (Fig. 1). It is confirmed by characterizations such as Raman spectroscopy and X-ray diffraction that the as-grown crystals have favorable crystallinity, which may attribute to the low-temperature and static growth process. On the other hand, it is known that the GaSe is a typical nonlinear optic crystal used for frequency conversion. We analyzed the nonlinear optical coefficient theoretically by density function theory and confirmed the result in infrared range by second harmonic generation (SHG) experiments. The calculation matches to experiment exactly and also indicate that the InSe, with similar lattice structure with GaSe, also has potential of nonlinear optical application. Indeed, in our previous transmittance measurement on InSe using different frequency generation (DFG) terahertz (THz) light source, it was shown that the absorption in terahertz range of InSe was far smaller than that of GaSe (Fig. 2). The present study has clarified the potential of InSe to be applied as nonlinear optical crystal for THz generation.



