二次元カルコゲナイド InSe 結晶の低温液相成長とそのテラヘルツ光学特性

Low temperature liquid phase growth and terahertz optical properties of 2D chalcogenide InSe crystal

東北大工 [1], ○唐　超 [1], 佐藤　陽平 [1]、渡辺　克也 [1]、大崎　淳也 [1]、田邊　匡生 [1]、小山　裕 [1]

Tohoku Univ. [1], ○Chao Tang[1], Yohei Sato[1], Katsuya Watanabe[1], Junya Osaki[1], Tadao Tanabe[1], Yutaka Oyama[1],

E-mail: tang.chao.s5@dc.tohoku.ac.jp

High quality InSe crystals have been successfully grown by temperature difference method under controlled vapor pressure (TDM-CVP) [1], which is a low temperature solution crystal growth approach allowing stoichiometry control via the application of selenium vapor pressure (Fig. 1). The optical properties in terahertz frequency range have been investigated using both the terahertz time domain spectroscopy (THz-TDS) and monochromatic terahertz spectroscopy via different frequency generation (DFG) process. It is shown that the absorption in terahertz range of InSe is far smaller than that of GaSe (Fig. 2). The Hall effect measurements are compared with the THz-TDS results in view of the carrier mobility and it is indicated that the estimation of carrier dynamics from THz spectroscopy is valid under some measurement conditions. The present study has clarified the potential of InSe to be applied as nonlinear optical crystal for THz generation.

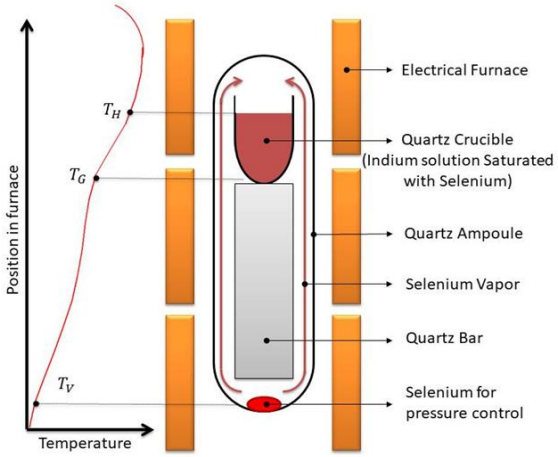

Fig.1. Schematic diagram of the temperature difference method under controlled vapor pressure

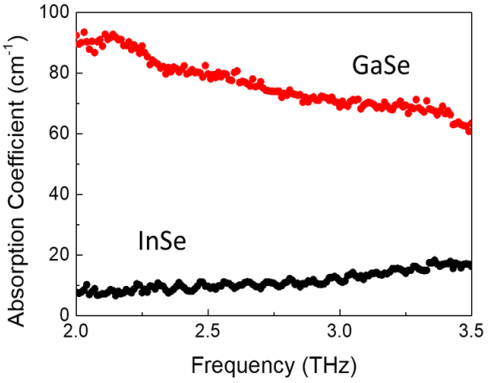

Fig. 2. THz range absorption spectra of InSe (red) and GaSe (black) tested by using coherent THz waves generated via DFG process.

[1] C. Tang, Y. Sato, T. Tanabe, Y. Oyama, *Journal of Crystal Growth*, **495** (2018) 54-58.

© 2019年 応用物理学会