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Abstract:The frequency-dependent optical constants of GaSe:S crystals, refractive indexes, and obsorption conficients, were measured by using the terahertz time-domain spectroscopy. By the temporal-profile measurements of the terahertz pulse, the ordinary refractive index and absorption coefficients of GaSe1-xSx(x=0, 0.01, 0.14, 0.26, 0.37) crystals in the range of 0.2-2.0 THz were obtained directly. The vibration modes of two phonons (E(2)′ and E(2)″) on the absorption spectra were measured, in which their intensities and frequencies change with the doped amounts of sulfur. Furthermore, for the first time to our knowledge, the possibility of ee-e down-conversion in the THz range was demonstrated by a simulation.