

Time-resolved terahertz spectroscopy of charge carrier dynamics in the chalcogenide glass As₃₀Se₃₀Te₄₀ [Invited] - DTU Orbit (09/11/2017)

Time-resolved terahertz spectroscopy of charge carrier dynamics in the chalcogenide glass As₃₀Se₃₀Te₄₀ [Invited]

Broadband (1.6-18 THz) terahertz time-domain spectroscopy (THz-TDS) and time-resolved terahertz spectroscopy (TRTS) were performed on a 54 μm thick chalcogenide glass (As₃₀Se₃₀Te₄₀) sample with a two-color laser-induced air plasma THz system in transmission and reflection modes, respectively. Two absorption bands at 2-3 and 5-8 THz were observed. TRTS reveals an ultrafast relaxation process of the photoinduced carrier response, well described by a rate equation model with a finite concentration of mid-bandgap trap states for self-trapped excitons. The photoinduced conductivity can be well described by the Drude-Smith conductivity model with a carrier scattering time of 12-17 fs, and we observe significant carrier localization effects. A fast refractive index change was observed 100 fs before the conductivity reached its maximum, with 2 orders of magnitude larger amplitude than expected for the optically induced THz Kerr effect, indicating that free carriers are responsible for the transient index change. (C) 2016 Chinese Laser Press

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Authors: Wang, T. (Intern), Romanova, E. A. (Ekstern), Abdel-Moneim, N. (Ekstern), Furniss, D. (Ekstern), Loth, A. (Ekstern), Tang, Z. (Ekstern), Seddon, A. (Ekstern), Benson, T. (Ekstern), Lavrinenko, A. (Intern), Jepsen, P. U. (Intern)

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