

Two-photon quantum well infrared photodetectors in the THz-regime

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Two-photon quantum well infrared photodetectors (QWIPs) are interesting devices for the investigation of ultrashort pulses in the mid-infrared[1] and THz-regime[2]. In these devices the photocurrent shows a quadratical dependence on the intensity of the incoming radiation which is useful in autocorrelation experiments.

We are currently investigating two-photon QWIPs based on the GaAs/AlGaAs material system with an aluminum content lower than 5% in the barrier, which leads to absorption wavelengths above 50 μ m.

Here we present first measurements of the electronic and optical properties of our samples. We performed dark current measurements and observed large current discontinuities which can be attributed to impact ionization. Photocurrent spectra confirmed the expected absorption wavelengths and showed evidence of further signatures related to optical-phonons. We also present results of autocorrelation measurements at the free-electron laser FELBE at the Helmholtz-Zentrum Dresden-Rossendorf.

[1] H. Schneider, O. Drachenko, S. Winnerl, M. Helm and M. Walther, Appl. Phys. Lett. 89, 133508 (2006).

[2] H. Schneider, H. C. Liu, S. Winnerl, C. Y. Song, M. Walther and M. Helm; Optics Express 17, 12279 (2009).

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