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Photoconductive ultrafast low gap materials: pulsed THz emitters and detectors BRANKO PETROV, ANDRE FEKECS, Universite de Sherbrooke, MARTIN CHICOINE, FRANCOIS SCHIETTEKATTE, Universite de Montreal, RICHARD ARES, DENIS MORRIS, Universite de Sherbrooke — Commonly photoconductive (PC) switches used for pulsed THz generation and detection are made on GaAs which works at 800 nm. However, there is a need for PC materials compatible with laser sources emitting at 1550 nm since they are of high interest for fiber-coupled devices to be integrated in THz imaging and spectroscopy systems. We have developed such materials based on low bandgap III-V semiconductors. With our novel approach, based on cold-implantation of heavy ions followed by a rapid thermal annealing (RTA) treatment, it was possible to obtain high resistivity (up to 2500 Ω·cm) and short lifetime (<1ps) materials [1]. THz PC antennas were made on these materials and their characteristics were studied by using a THz time-domain spectroscopy (TDS) setup. The impact of the RTA process and different electrode designs were investigated in order to compare the characteristics of PC antennas in terms of amplitude, bandwidth, and signal to noise ratio. For the emitters, bias-voltage and pump-power dependences are shown. Remarkably high electric field (>50 kV/cm) could be applied for increased emission of pulsed THz radiation due to the high resistivity of our materials. Our THz-TDS setup offers measurement capabilities from 0.1 to 3 THz. [1] A. Fekecs et al., Opt. Mater. 1, 7 (2011)

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