Abstract Submitted
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Ultrafast photocurrents and THz generation in single InAs-nanowires[1] ALEXANDER HOLLEITNER, NADINE ERHARD, GERHARD ABSTREITER, GREGOR KOBLMULLER, Technical University Munich, Walter Schottky Institut and Physics Department — Conventional scanning photocurrent microscopy experiments on semiconductor nanowires are typically limited to timescales exceeding 10 ps. Yet, it is known from optical experiments that carrier relaxation and transport processes can occur on much faster timescales in such wires. We therefore apply a recently developed pump-probe photocurrent spectroscopy based on coplanar striplines [1] to investigate the photocurrent dynamics of single GaAs- and InAs-nanowires with a picosecond time-resolution [2]. The ultrafast photocurrent response of the nanowires is sampled in the time-domain with the help of Auston switches. We discuss data on single InAs-nanowires which are interpreted in terms of a photo-thermoelectric current and the transport of photogenerated holes to the electrodes as the dominating ultrafast photocurrent contributions. Moreover, we show that THz radiation is generated in the optically excited InAs-nanowires, which we interpret in terms of a dominating photo-Dember effect [3]. The results are relevant for nanowire-based optoelectronic and photovoltaic applications as well as for the design of nanowire-based THz sources. [1] L. Prechtel, et al. Nature Communications 3, 646 (2012). [2] L. Prechtel, et al. Nano Letters . 12, 2337 (2012). [3] N. Erhard, et al. (2013).

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