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Carrier dynamics in silicon nanowires studied using optical-pump terahertz-probe spectroscopy ALEXANDRE BEAUDOIN, Institut interdisciplinaire d'innovation technologique (3iT), Universite de Sherbrooke, Sherbrooke, Qc. Ca., BASSEM SALEM, THIERRY BARON, LTM-UMR 5129 CNRS-UJF, CEA Grenoble, France, PASCAL GENTILE, SiNaPS Laboratory SP2M, UMR-E CEA/UJFGrenoble 1, France, DENIS MORRIS, Institut interdisciplinaire d'innovation technologique (3iT), Universite de Sherbrooke, Sherbrooke, Qc. Ca. — The advance of non-contact measurements involving pulsed terahertz radiation presents great interests for characterizing electrical properties of a large ensemble of nanowires. In this work, N-doped and undoped silicon nanowires (SiNWs) grown by chemical vapour deposition (CVD) on quartz substrate were characterized using optical-pump terahertz probe (OPTP) transmission experiments. Our results show that defects and ionized impurities introduced by N-doping the CVD-grown SiNWs tend to reduce the photoexcited carrier lifetime and degrade their conductivity properties. Capture mechanisms by the surface trap states play a key role on the photocarrier dynamics in theses small diameters' ($\sim$100 nm) SiNWs and the doping level is found to alter this dynamics. We propose convincing capture and recombination scenarios that explain our OPTP measurements. Fits of our photoconductivity data curves, from 0.5 to 2 THz, using a Drude-plasmon conductivity model allow determining photocarrier mobility values of 190 and 70 $cm^2/V{\cdot}s$, for the undoped and N-doped NWs samples, respectively.

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