

## Terahertz wafer-scale mobility mapping of graphene on insulating substrates without a gate - DTU Orbit (08/11/2017)

### Terahertz wafer-scale mobility mapping of graphene on insulating substrates without a gate

We demonstrate wafer-scale, non-contact mapping of essential carrier transport parameters, carrier mobility ( $\mu(\text{drift})$ ), carrier density ( $N\text{-S}$ ), DC sheet conductance ( $\sigma(\text{dc})$ ), and carrier scattering time ( $\tau(\text{SC})$ ) in CVD graphene, using spatially resolved terahertz time-domain conductance spectroscopy.  $\sigma(\text{dc})$  and  $\tau(\text{SC})$  are directly extracted from Drude model fits to terahertz conductance spectra obtained in each pixel of  $10 \times 10 \text{ cm}^2$  maps with a  $400 \text{ nm}$  step size.  $\sigma(\text{dc})$ - and  $\tau(\text{SC})$ -maps are translated into  $\mu(\text{drift})$  and  $N\text{-S}$  maps through Boltzmann transport theory for graphene charge carriers and these parameters are directly compared to van der Pauw device measurements on the same wafer. The technique is compatible with all substrate materials that exhibit a reasonably low absorption coefficient for terahertz radiation. This includes many materials used for transferring CVD graphene in production facilities as well as in envisioned products, such as polymer films, glass substrates, cloth, or paper substrates. (c) 2015 Optical Society of America

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Authors: Buron, J. D. (Intern), Mackenzie, D. M. A. (Intern), Petersen, D. H. (Intern), Pesquera, A. (Ekstern), Centeno, A. (Ekstern), Bøggild, P. (Intern), Zurutuza, A. (Ekstern), Jepsen, P. U. (Intern)

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