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Conductivity and Mobility Measurements

Within the SFB 595 project a four-point probe and a van der Pauw geometry setup are available for conductivity measurements. For the separation of charge carrier concentration and mobility, as well as for the determination of the charge carrier type, an additional Hall measurements setup is necessary and disposable.
The electrical conductivity of semiconductors strongly influences device properties regarding their electrical functionality. The specific conductivity of a material is given by the elementary charge, the carrier concentration and the mobility of the respective charge carriers. The mobility of charge carriers in semiconductors is determined by different electron scattering mechanisms. The most important ones are impurity scattering (ionized and neutral impurities), dislocation and grain boundary scattering, phonon scattering mechanisms (acoustic and optical) and piezoelectric scattering. The main important parameters, which influence the mobility and in turn device functionality are the concentration of the respective scattering species, temperature and electric charge of the defects.