

Electro-optical properties of individual CdS nanowires

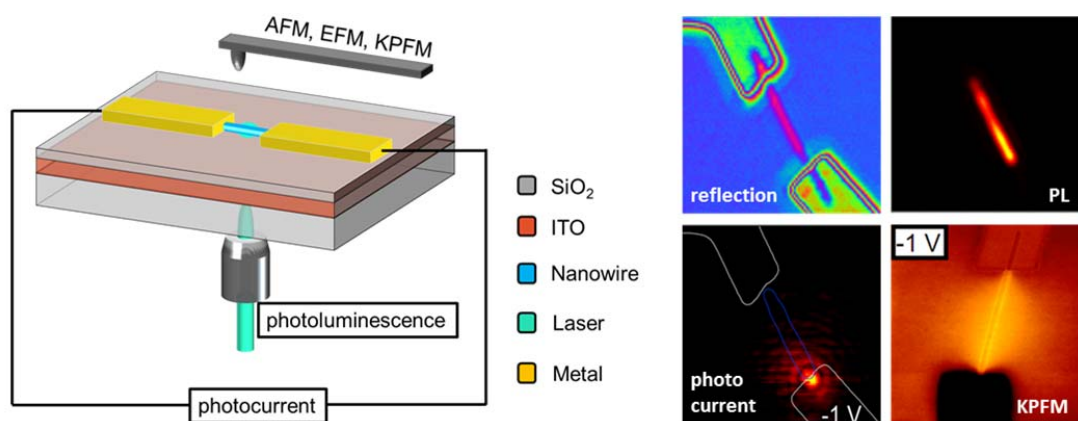
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Individual CdS nanowires (NWs) grown by hydrothermal methods with diameters in the range of 50 nm are investigated by confocal photo luminescence (PL-) spectroscopy, Kelvin Probe Force Microscopy (KPFM), and electrical transport measurements. Since the glass substrates used are covered with transparent conductive oxides (ITO) and an additional insulation layer (SiO_2) we can combine several techniques and perform experiments such as KMPF under local illumination in combination with photo conductivity imaging.

Firstly we will show how charges distribute along free standing NWs upon local illumination with a confocal microscope. We will show that photo generated electrons spread much wider along the nanowires than the holes, which leads to a charge imbalance that can be measured by KPFM. Then we will present PL measurements of CdS-NWs where charges are injected through patterned gold contacts. We will show that the injection of positive holes will result in a reversible PL-quenching of the NWs such that the PL can be modulated in a frequency range up to 10 kHz. Finally we investigated the process of local photo conductivity of contacted individual CdS-NWs by applying a combination of confocal microscopy and KPFM. We measure the potential profiles along the contacted NWs with and without local illumination and compare the data with theoretical simulations.



Experimental setup to investigate the electro optical properties of individual CdS nanowires and examples for different types of scanning probe images