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[ CHM-175 ] Design and construction a four-point method system for electrical characterization of thin films with photovoltaic applications

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We present a system for measuring the sheet resistance by the four point method in semiconductor thin films. The system includes: a sample holder, a head holder probes, two electrometers Keithley Model 6517B of high impedance, a current source Keithley 6221 and a multimeter Keithley model 2000, all connected to a computer through a GPIB interface. For calculating the sheet resistance of thin films, the Van Der Pauw method was used. Electrical measurements were performed in darkness and light. As a light source of a halogen lamp 50 watts and a wavelength ranging from 300 to 800 nanometers it is used. The measurement involves placing the sample in the sample holder, placed above the tip holder and verify that the tips are in contact with the thin film, the computer program in a sweep current supplied by the power amperage through two points which fence in the ranges for the deposited semiconductor material and obtain a voltage at one end of each electrometer finally measuring the potential difference between both the voltmeter and registering in a database on the computer. IV curves were performed for CdS:Mg and ZnO:Al thin films. Chemical Bath Deposition and Spray Pyrolysis methods were employed to deposit thin films on glass substrates. The behavior of metal and semiconductor junction is present in all thin films, and there is a growing exponential increase in the measured voltage for current applied. For CdS:Mg thin films values of sheet resistance was observed that the tendency of resistance decreasing between 1 G $\Omega$  to 100 M $\Omega$  applying light on thin films. Resistance in ZnO:Al films was in 1 to 5 M $\Omega$ . This work is supported by SIP-IPN 20150599 project.