

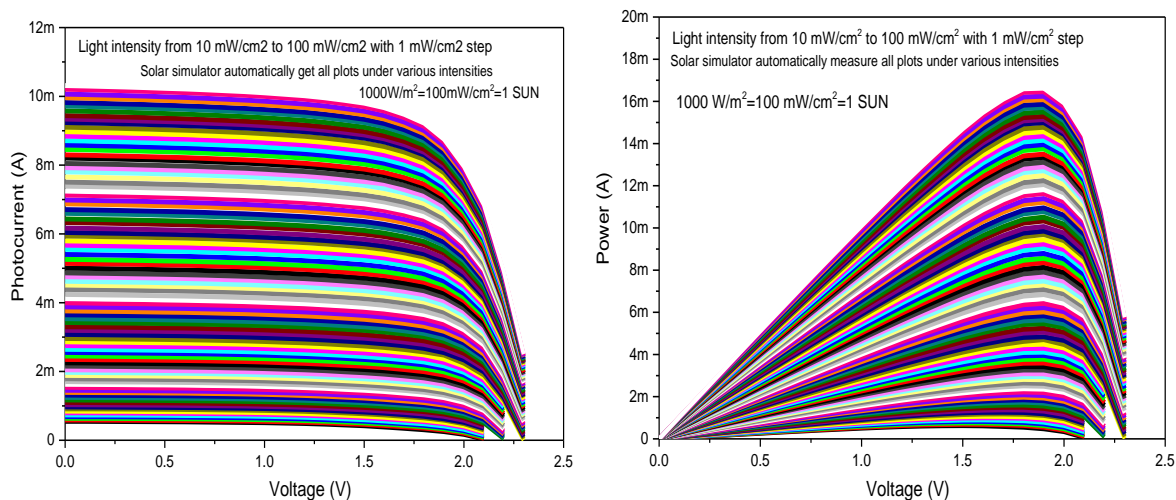
Solar Simulator system is controlled automatically by computer

Solar Simulator system adjusts automatically the intensity of light 0.1 W/m^2 - 1000 W/m^2 by any step, for example from 1 W/m^2 to 1000 W/m^2 with 1 W/m^2 .

Solar Simulator system automatically measures current-voltage (I-V) under various light intensities

Solar Simulator system automatically measures power-voltage (P-V) under various light intensities

Solar Simulator system automatically analyses photovoltaic mechanism (I-V) under various light intensities



Solar Simulator system automatically measures power-voltage (P-V) under various light intensities

IMPEDANCE SPECTROSCOPY

Impedance

The complex impedance is expressed by the following

$$Z=R+iX$$

where R is the real part of impedance and X is the imaginary part of impedance

The circuit modes are series and paralel

$$Z, R_s, X_s, R_p, X_p$$

Capacitance

The complex capacitance is expressed by the following

$$C^*=C+iD$$

where C is the real part of capacitance and D is the imaginary part of capacitance.

The circuit mode are series and paralel

$$C_p, C_s, D, Q$$

Admittance

The complex impedance is expressed by the following

$$Y = G + iB$$

where G is the real part of admittance, i.e. conductance and B is the imaginary part of admittance, i.e. susceptance

The circuit mode are series and paralel

$$Y, G_p, B_p, G_s, B_s$$

Inductance

$$L_s, L_p$$

Nyquist Plot

Real part of Z versus Imaginary part of Impedance

To better understand the kinetics process of charge transport in solid-state QDSSCs, electrochemical impedance spectroscopy (EIS) is performed using a 0.4 V bias voltage under dark conditions.

As shown in Figure 1, two arcs are clearly observed in the Nyquist plot of a solar cell. In order to achieve the values of charge transport resistance (R_t) and charge recombination resistance (R_{rec}), respectively corresponding to the first arc at high frequency and the second arc at middle frequency

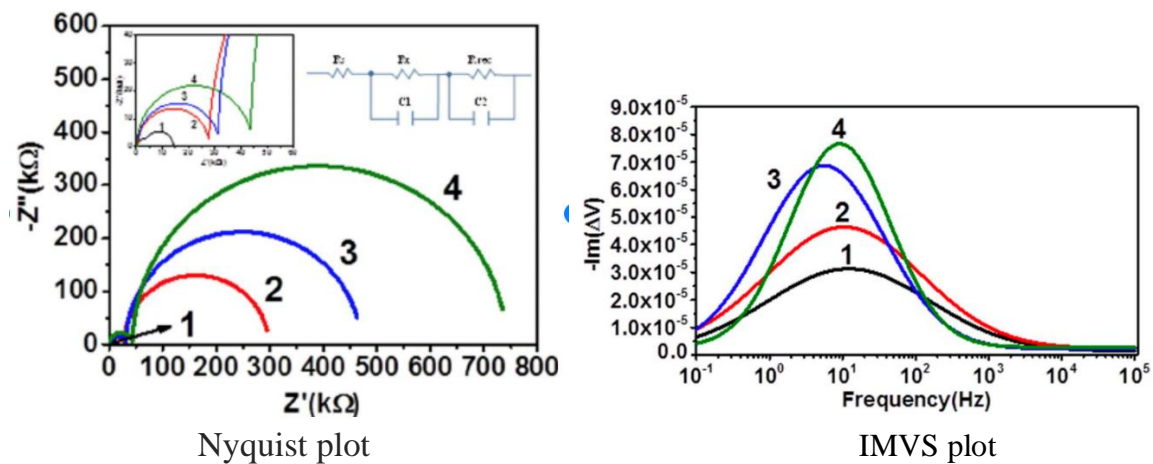


Figure 1 Nyquist and IMVS plots of a solar cell