Development of nanostructured FTO films as transparent and diffuse electrodes and their integration in silicon solar cells

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Transparent electrodes are an essential component in solar cells as current-collecting electrode on the sun-facing side of the cell. Generally, they consist in an oxide thin layer presenting high transparency and good electrical conductivity. They can also present an additional function of haziness to improve optical absorption (through an increase of optical path) when integrated in thin films solar cells. A way to obtain such light scattering is to texture the TCOs, i.e. by increasing the surface roughness in order to enhance the ratio of the diffuse transmittance while keeping a high value of total transmittance as well as low electrical resistance.

In this work we prepare transparent electrodes combining a nanostructured nanocomposite layer of zinc or aluminum oxides with a fluorine-doped tin oxide (Figure 1). These structures are integrated on solar cells (Figure 2) .

We will present the elaborations of new nanostructured and diffused electrodes of fluorine doped SnO_2 (D-FTO) in order to increase the light scattering in the visible range. This nanocomposite is obtained by combining successive depositions of periodic structures of nano-ZnO and optimized thin layers of FTO elaborated by Aerosol Assisted CVD

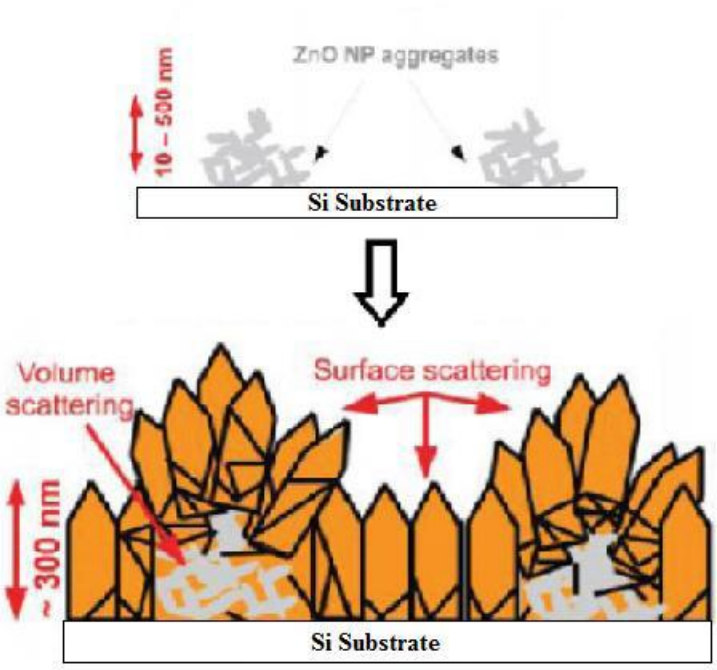

Figure 1: Nanostructured transparent electrode

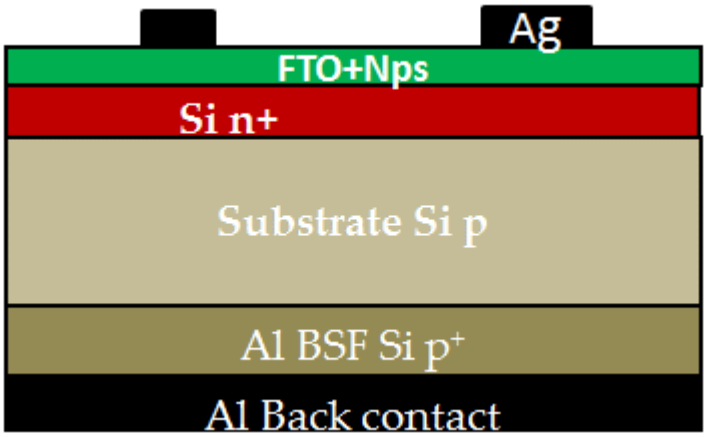

Figure 2 : Solar Cell with nanostructured transparent electrode as current-collecting electrode