Full Title

Development of nanostructured materials for solar cells and other applications.

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Abstract (Arial 10)

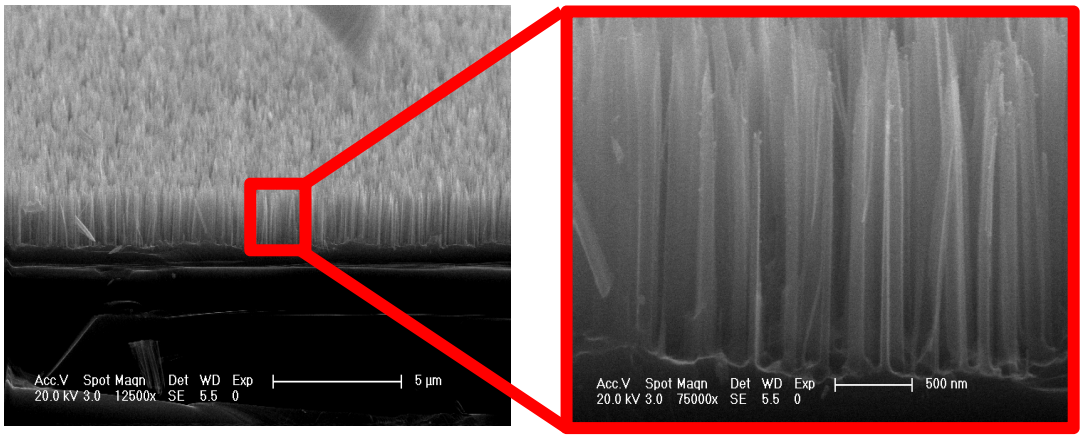
The main goal of this research has been the creation of a nanostructured silicon surface capable of a high reduction of the reflectance, using an inexpensive and scalable method.

Vertically aligned silicon nanowire (Si NW) arrays have been fabricated using an electroless etching (EE) method. This method involves etching of silicon wafers in a silver nitrate and hydrofluoric acid based solution. We have studied different parameters of this growth and its effects over the reflectivity. The Si NWs were characterized by SEM and XRD.

Si NWs have been directly synthesized by the use of a nitrate and hydrofluoric acid based solution. This method gives a constant rate of growth for each temperature being quite sensitive for this parameter. During the attack of the solution, homogeneously dispersed silver ions come into contact with the substrate surface. Then galvanic reactions take place simultaneously, and as a result, silicon is lost into the solution as SiF6, leaving pits on the wafer surface. The preferential deposition of the silver ions into these pits leads to the SiNWs formations.

Conclusion:
1) Si NWs can be synthesized by electroless etching method. The temperature and etching time are critical factors that determine the length of the Si NW and the reflectance of the attacked wafer.
2) Vertically aligned Si NWs only grow on the polished face of the wafer.
3) The growth rate is determined by the temperature of the solution.

Figures



The SEM images show a periodic ordination of vertically aligned silicon nanowires. After an attack of 50 minutes at room temperature, we get an average length of 2.5microns.