

# Microscopy for Graetzel Solar cells manufacturing

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## Abstract

The Graetzel solar cells are devices composed by two transparent glass conductive surfaces, one nanocrystalline structure interfase of  $\text{TiO}_2$ , where a dye is introduced. The manufacturing process includes tasks where microscopy is an important tool. For instance an intermediate task is make conductive a  $\text{SiO}_2$  glass that normally is non conductive, so it is necessary take into account a diffusion and deposition process where an agent is linked to glass for get the conductive characteristic.

Two ways are identified for this task. One of them consist in depositing Tin chloride on the glass surface dry that salt and then it is oxydizing by a gas torch. Microscopy can be used for the study of the diffusion process, because a non homogeneous diffusion results in spots on the glass surface. Once that a layer of  $\text{SnCl}_2$  is deposited on the glass, it is oxidized

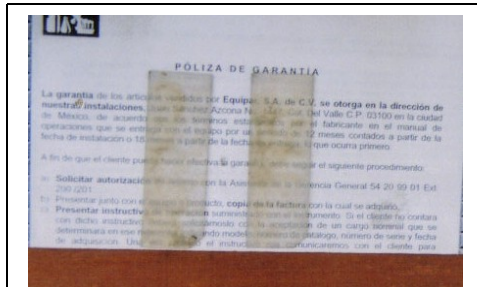


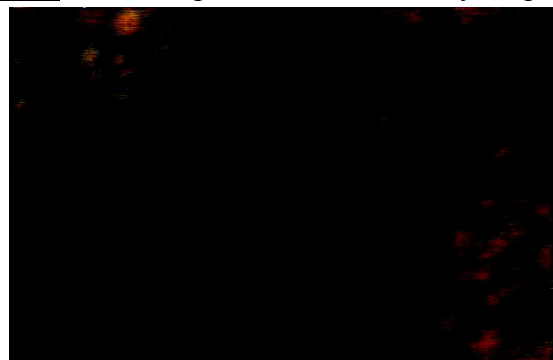
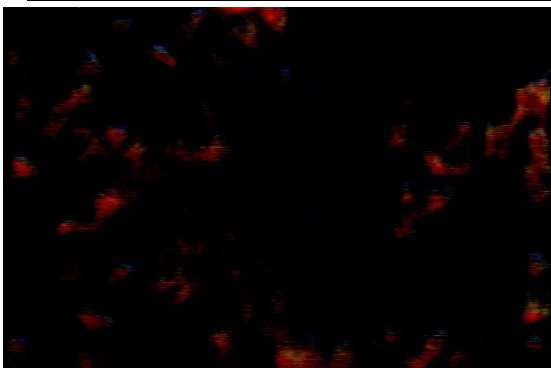
Fig 1 Spotted conductive glass



Fig 2 Fluoride quelant makes more firmly and spot free transparent conductive layer

getting a conductive and transparent layer.

The second identified form for depositing the conductive layer is by spray of a solution of tin chloride on Chlorhidric acid and amonium flouride, meanwhile the glass is heated by the gas torch. This process is more reliable because the amonium fluoride forms a quelant with the  $\text{SiO}_2$ , and the conductive layer is firmly attached to glass. Using this process brings a more transparent conductive layer spot



free, we used the optical microscopy for verify the quality of deposition finding some microscopical spots.



Fig 4 A 160X view of the TiO<sub>2</sub> surface, fractures and bubble effect can be observed

The TiO<sub>2</sub> Layer needs a more fine microscopy, no big imperfections were observed using the optical one. It is supposed this layer has nanocavities where a dye will be introduced for donate an electrone an be part of a light activated electricity generator. A SEM microscopy study is being made for prove the method for construct the TiO<sub>2</sub> layer is appropriated for get nanocavities where the dye will be entered.

## CONCLUSION

Microscopy can be used for microdifusional effects which yield the quality of finished for conductive layers of solar cells. Is an important tool for mesure the quality of layers.

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