

Fabricating Fluorine Doped Tin Oxide (FTO) Thin Films and Nanorods

Bryan Russo
IGERT Rotation Fellowship
Materials Science and Engineering
March 6th, 2007

FTO is a commonly encountered transparent semiconducting material

FTO is $\text{SnO}_2 + \text{F}$ as a direct substitute for O (thereby adding electrons to the system and improving conductivity)

It is often used for solar cell electrodes, LCD displays, gas sensors, and electrochromic displays

For many of these applications, the utilization of nanorod FTO arrays may help boost performance

There has been no published attempts to fabricate FTO nanorods

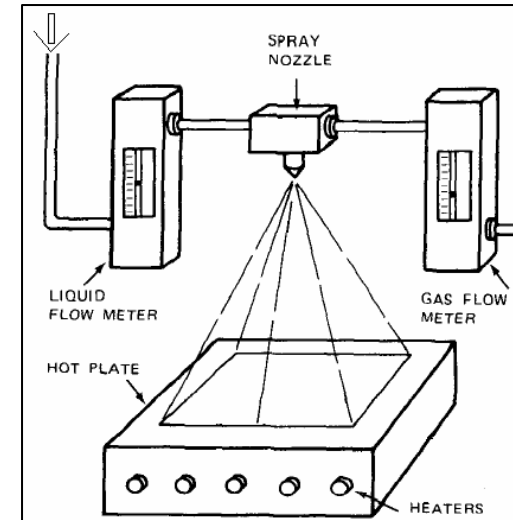
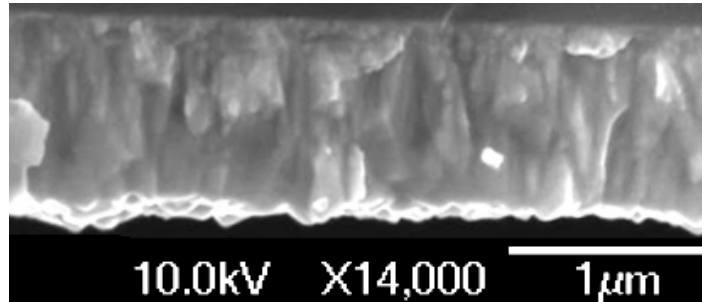


THE CENTER FOR
NANOTECHNOLOGY

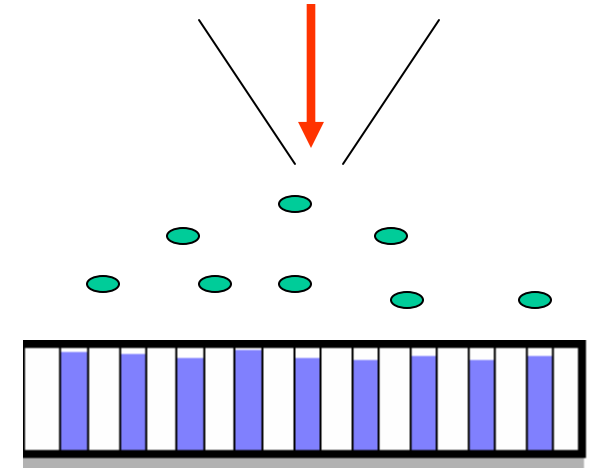
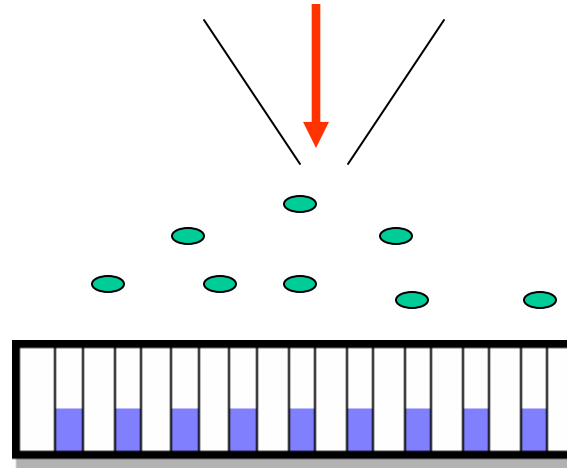
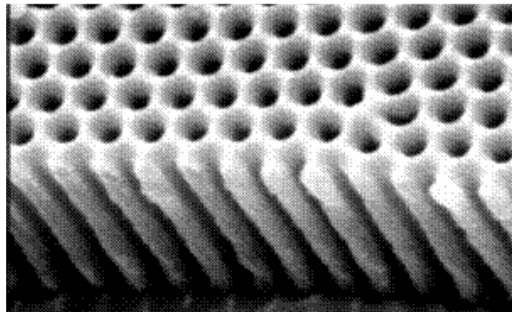


Fabricating Fluorine Doped Tin Oxide (FTO) Thin Films and Nanorods

1st: Fabricated FTO thin films in order to optimize solution composition via spray pyrolysis



2nd: Employed Template Assisted Growth in order to fabricate FTO nanorods utilizing the same solution (dissolve template with KOH)



THE CENTER FOR
NANOTECHNOLOGY



Fabricating Fluorine Doped Tin Oxide (FTO) Thin Films and Nanorods

Results:

1. Successful Fabrication of Nanorod Array
2. Electrical Resistivity Measured $4 \times 10^{-1} \Omega\text{-cm}$

Conclusions:

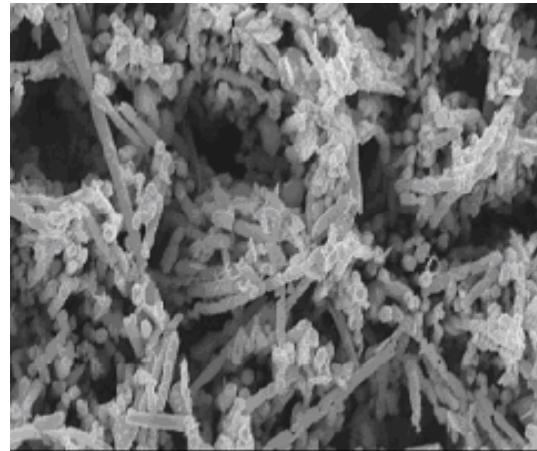
1. Fabrication is possible
2. Resistivity value high, but encouraging

Questions:

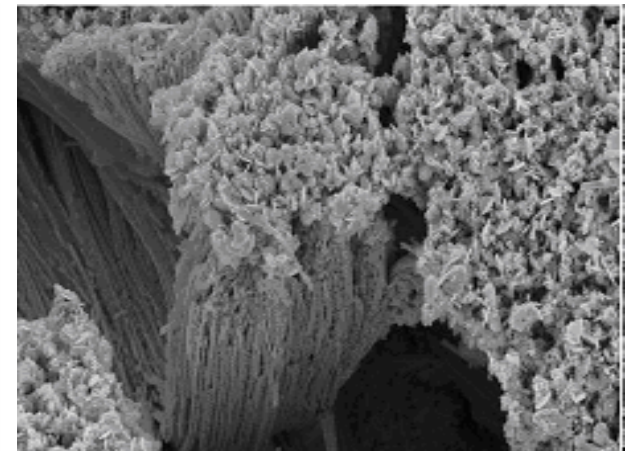
1. ECD option?
2. Can it be utilized in as a solar cell electrode?

Next Steps

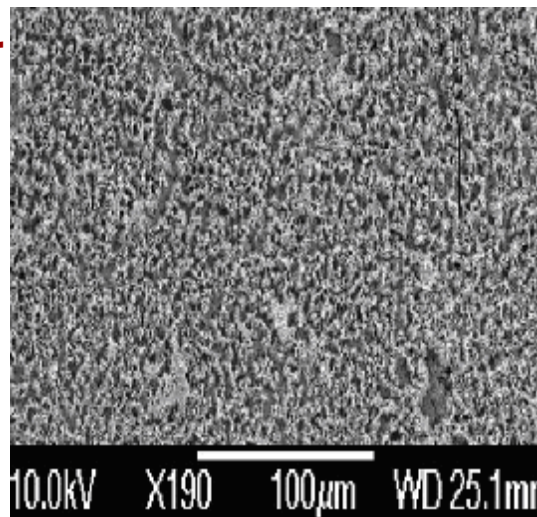
1. Attempt to publish results
2. Optimize growth conditions
3. Implement in test device



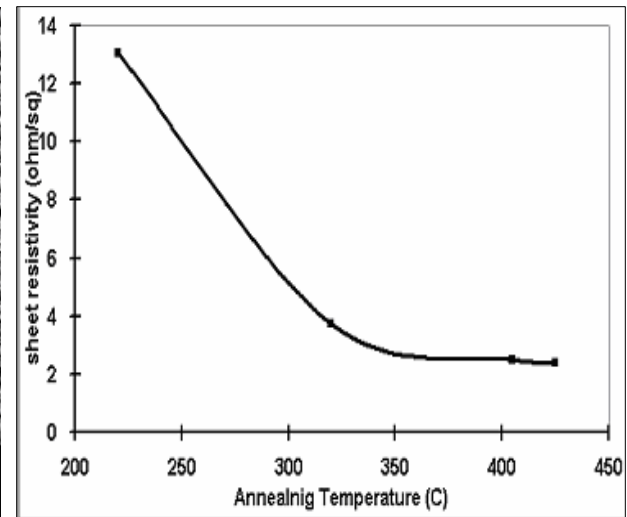
10.0kV X4,000 1μm WD 24.9mm



10.0kV X1,400 10μm WD 24.4mm



10.0kV X190 100μm WD 25.1mm



THE CENTER FOR
NANOTECHNOLOGY

UNIVERSITY OF
WASHINGTON