

## Growth of TiO<sub>2</sub> Oriented Arrays for Photovoltaic Applications

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**Objectives:** The major goal is to develop nanostructured TiO<sub>2</sub> that will be able to deliver higher conversion efficiency compared to the conventional photovoltaic semiconductor materials. We will explore synthesis of TiO<sub>2</sub> nanotube (TONT) arrays by chemical vapor deposition (CVD) technique. Different Ti precursors (including TiCl<sub>4</sub> and Ti metal-organics) and novel oxidants will be used to grow TONT on Si substrates patterned with appropriate catalyst. These materials will be tested in applications dealing with dye-sensitized solar cells.

### Approach:

- Taking advantage of the huge TONT array surface area, and their vertical orientation
- Using CVD technique to grow TONT arrays on Si substrate
- Employing the existing experience at UC to grow arrays of oriented carbon nanotubes (CNT)-(see Fig. 8).
- Evaluation of catalyst performance in dye-sensitized solar cells.

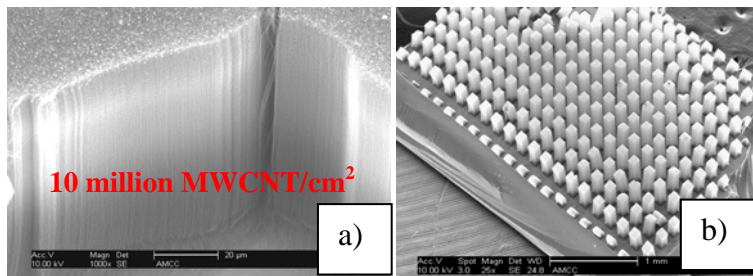


Fig. 8. Aligned, multi-wall carbon nanotube (MWCNT) arrays grown at UC;  
a) CNT array at high magnification, b) ½ mm long CNT patterned array at low magnification.