

## Lab session 4: Pollutant degradation

### Objective:

Degrade a dye used as marker of pollution with TiO<sub>2</sub> nanoparticles.

### Materials

Nanoporous TiO<sub>2</sub> Films  
 TiO<sub>2</sub> nanoparticles  
 Water  
 Dye (Methyl orange, Methyl red)  
 UV-lamp  
 Platinized FTO Glass  
 clamps  
 Laser  
 Photodiode  
 Multimeter  
 Stirrer & magnet  
 Subjection elements  
 1 large glass  
 3 plastic cubettes  
 1 pipette  
 Globes  
 UV-Glasses  
 Laboratory coat

### Procedure:

#### - Preparation of contaminated solution

Solve 20 mg of dye in 50 mL of water.

Put 50mg of TiO<sub>2</sub> nanoparticles in a small cubette and add 15 mL of the dyed solution. Keep the rest of the solution.

During 1 hour, shine UV light to the cubette while stirring continuously the solution

Stop the stirring and wait 30 minutes for TiO<sub>2</sub> decantation.

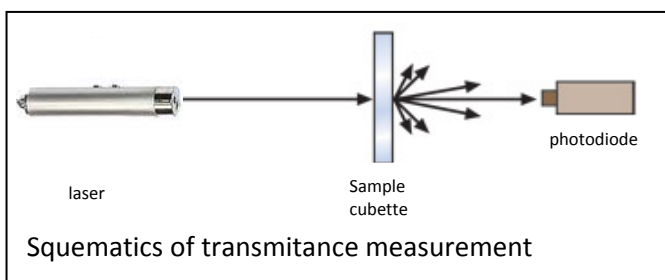
Take the upper part of the liquid with a pipette and move it to a cubette.

Measure the transparency of the

photodegraded solution with respect to the original one through the expression:

$$T = i_{\text{photo}} / i_{\text{photo},0}$$

where  $i_{\text{photo}}$  is the current at the photodiode after the laser light crosses the degraded sample and  $i_{\text{photo},0}$  is the photocurrent obtained for the original dyed solution.



### Results

Provide the change in transmittance of the solution.