

AC-TiO₂ composite catalyst for solar water treatment

C. TELEGANG CHEKEM^(1,2), Y. RICHARDSON⁽¹⁾, J. BLIN⁽¹⁾, V. GOETZ⁽²⁾

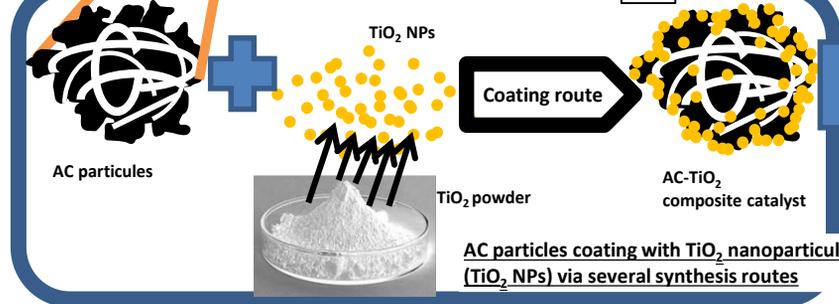
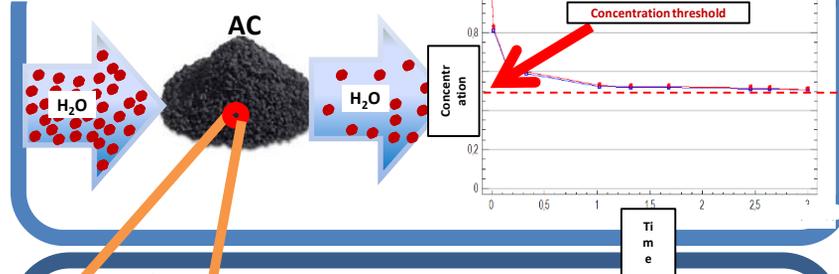
(1) Biomass, Energy and Biofuels laboratory (LBEB), International Institute of Water and Environmental Engineering, 01, Rue de la Science, 01 PO.Box 594 Ouagadougou, Burkina Faso

(2) PROMES-CNRS UPR 8521, PROcess Material and Solar Energy, Université de Perpignan Via Domitia, 52 avenue Paul Alduy, 66860 Perpignan, France

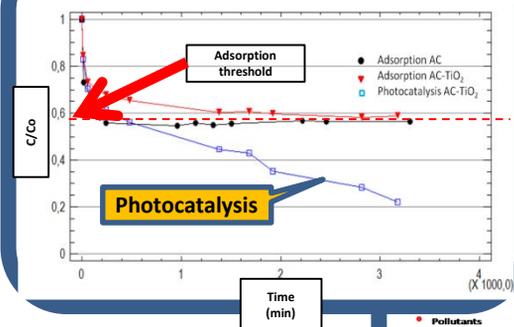
Main objective:

Elaborate activated carbon (AC)-titanium dioxide (TiO₂) based composite (AC-TiO₂), to be used as catalyst for solar photodegradation of biorefractories:

Adsorption residual concentration threshold

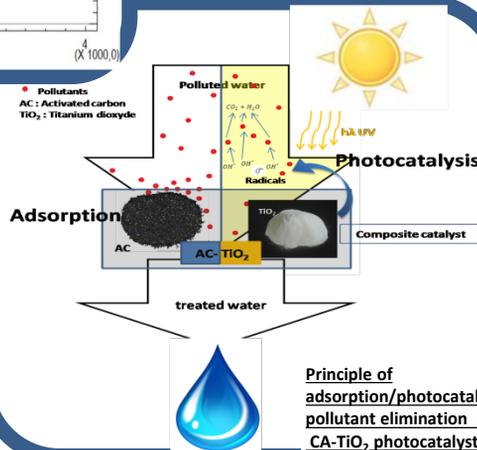


Photocatalytic degradation of phenol under laboratory artificial UV light: 13 W/m²



- ✓ Adsorption concentration threshold at 45% elimination rate
- ✓ No equilibrium threshold in photocatalysis scheme
- ✓ Unlimited photodegradation reactions until total disappearance of the pollutant

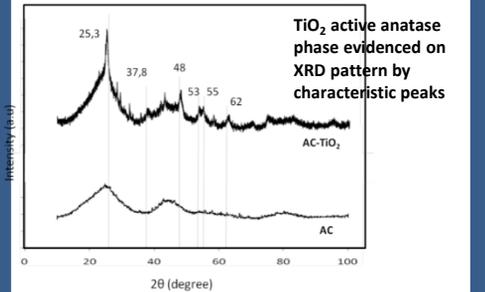
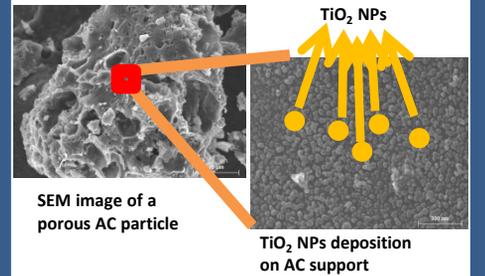
- ✓ adsorbent/catalyst multifunctional composite material
- ✓ Easy catalyst post treatment recovery compared to neat TiO₂ NPs
- ✓ Sunny areas in Africa subsaharian countries (>60W/m² solar UV radiation) can take profit of this type of material for sustainable removal of hazardous micropollutants from contaminated water



Research hypothesis:

- ❖ To go beyond the adsorption residual concentration threshold of the pollutant elimination rate.
- ❖ Self regeneration of the catalyst based upon the pollutant degradation unlike pollutant accumulation within simple adsorption scheme.
- ❖ To use solar UV radiations in sunny areas to efficiently remove emerging biorefractories in aqueous solutions.

Physicochemical characterization of the AC-TiO₂ composite catalyst



	$S_{BET} (m^2/g)$	$V_p (cm^3/g)$	$(2)V_{micro} (cm^3/g)$
AC	571	0.272	0.252
AC-TiO ₂	562	0.268	0.248

Almost no reduction of the initial surfaces area and porosity of the AC support before and after TiO₂ NPs impregnation

Perspectives :

- ❖ Optimization of titania content of the AC-TiO₂ composite catalyst
- ❖ Photodegradation reaction rate modelling
- ❖ Photocatalysis experiments on water treatment solar pilot.