

ELECTRONIC SUPPORTING INFORMATION (ESI)

The Adsorption efficiency of regenerable Chitosan-TiO₂ composite films in removing 2,4-Dinitrophenol from water

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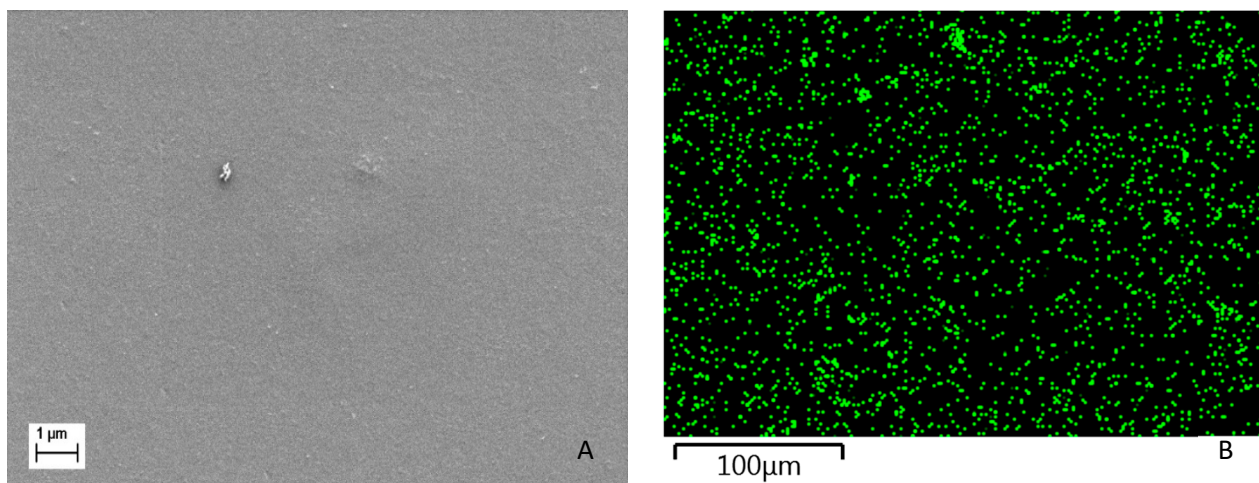


Figure S1: SEM image of CH/TiO₂ (A); EDS analysis of CH/TiO₂ (B)

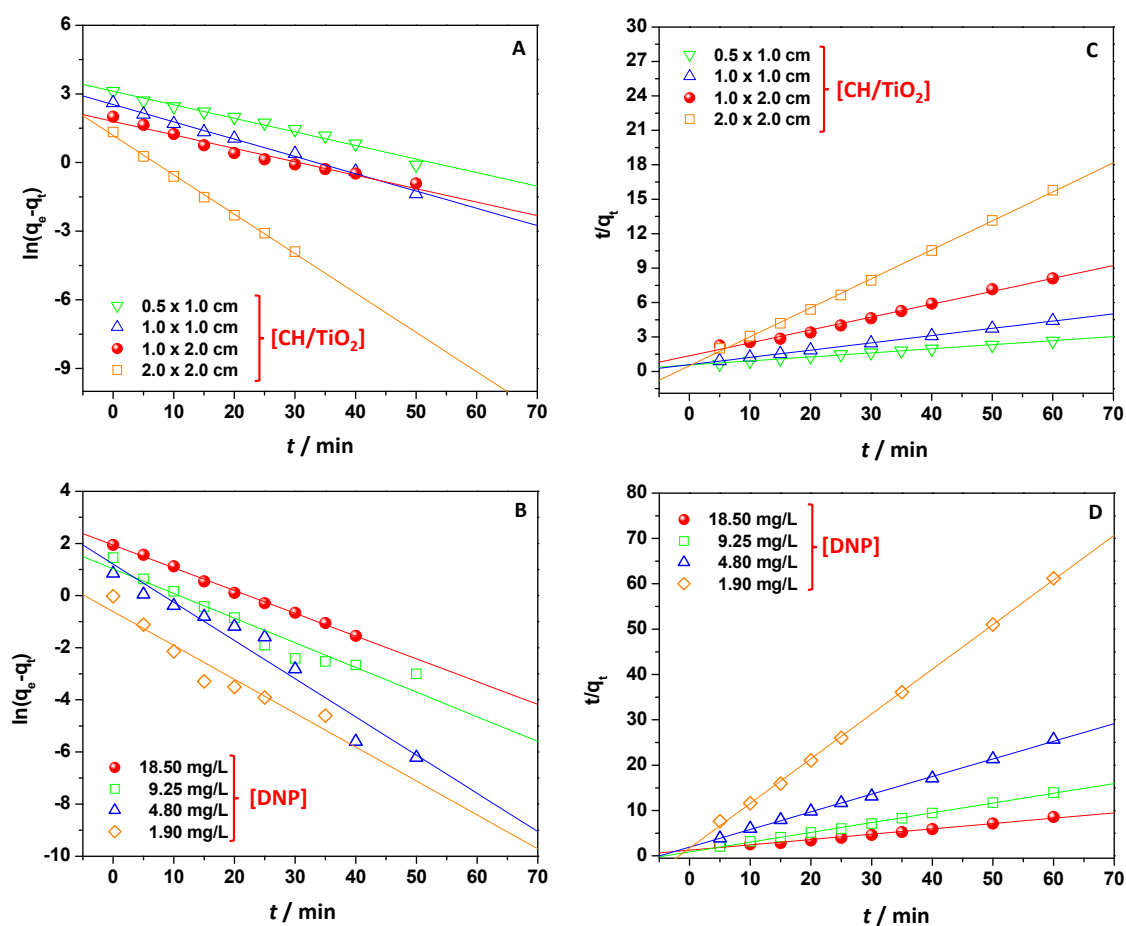


Figure S2: Pseudo-first (A, B) and Pseudo-second (C, D) order kinetic models applied to experimental data in which the amounts of adsorbent and adsorbate are changed.

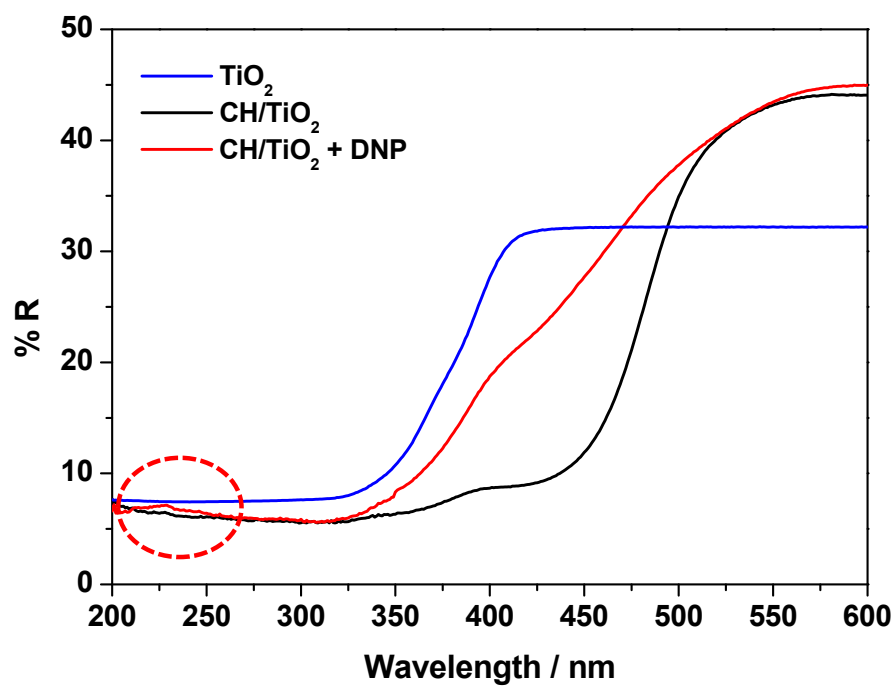


Figure S3: DRS of TiO_2 in powder, CH/TiO_2 and $\text{CH/TiO}_2 + \text{DNP}$.

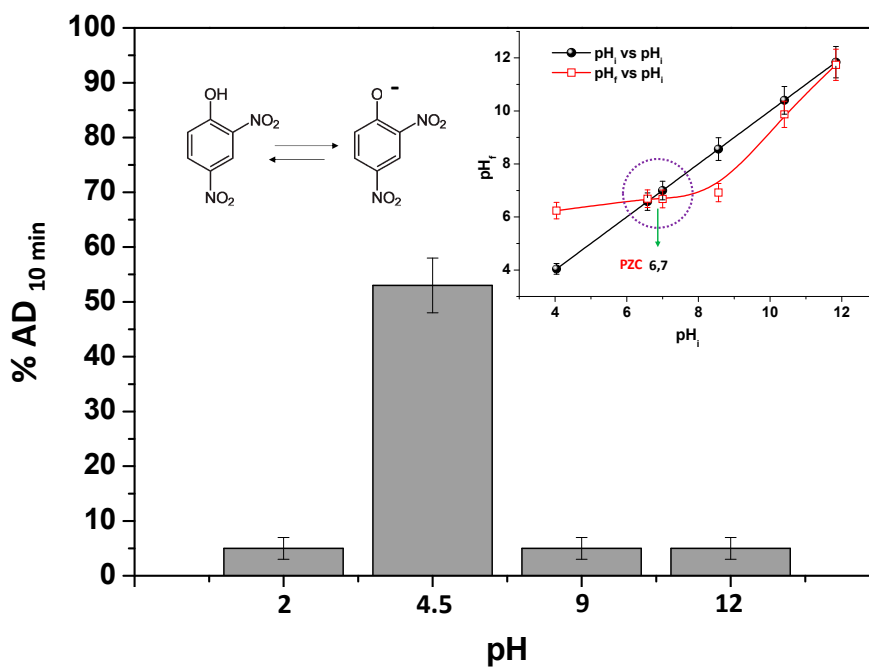


Figure S4: % of DNP adsorption onto CH/TiO_2 at different pH values. The *inset* reports the method to infer the pH_{PZC} .

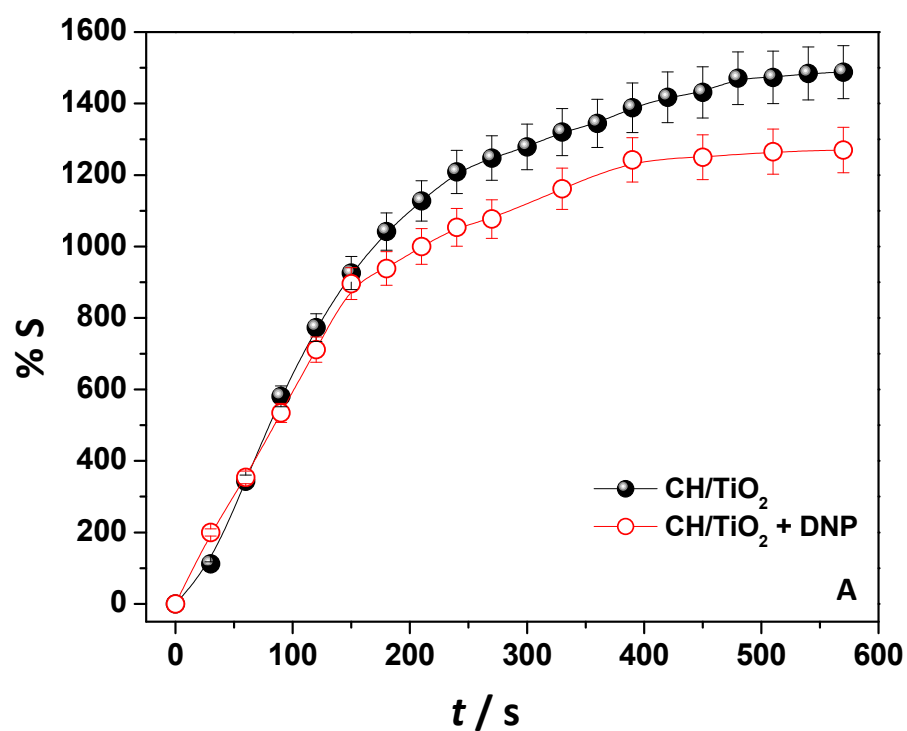


Figure S5: % of CH/TiO₂ and CH/TiO₂ + DNP swelling in water.

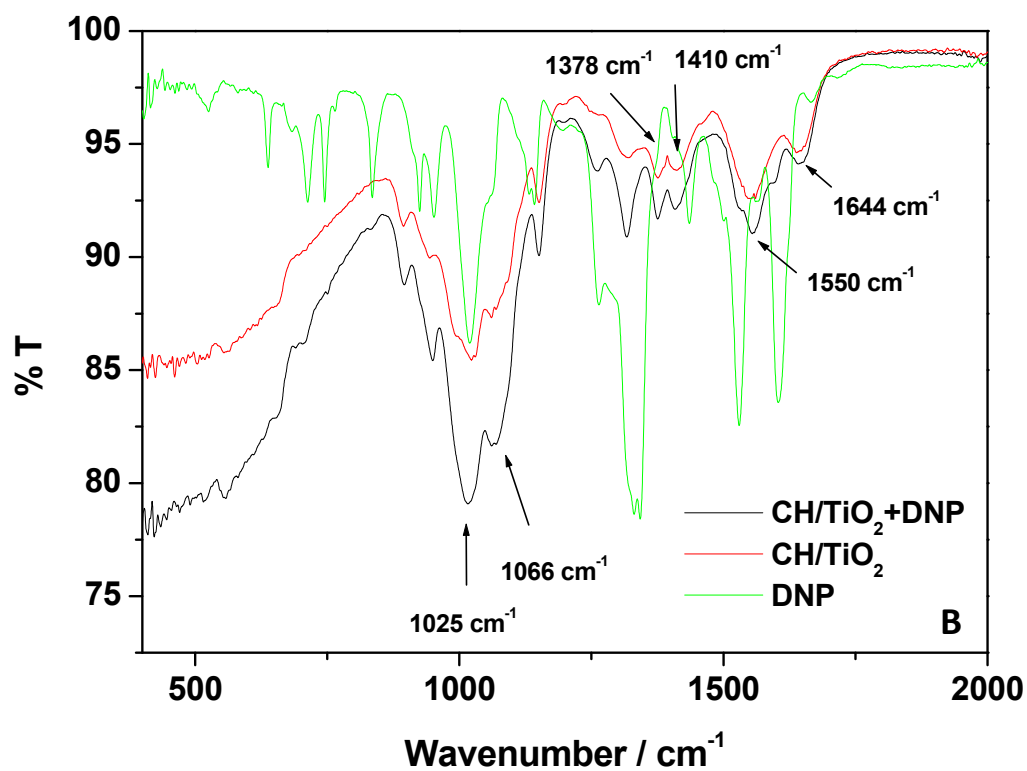


Figure S6: ATR-FTIR spectra of CH/TiO₂ in presence and absence of DNP.

Concentration (DNP) mg/L	Pseudo first-order				Pseudo second-order			
	q _e exp mg/g	q _e calc mg/g	K ₁ 1/min	R ²	q _e exp mg/g	q _e calc mg/g	K ₂ g/mg×min	R ²
18.50	7	7	6×10 ⁻²	0.9855	7	8	1×10 ⁻²	0.9961
9.25	4	3	9×10 ⁻²	0.9668	4	5	5×10 ⁻²	0.9992
4.80	2	3	2×10 ⁻¹	0.9746	2	3	8×10 ⁻²	0.9993
1.90	0.8	2	1×10 ⁻¹	0.9571	0.8	1	5×10 ⁻¹	0.9996

Table S1: Kinetic parameters referred to experiments in which the DNP amount is changed.

Chitosan size (cm×cm) and amount (g)	Pseudo first-order				Pseudo second-order			
	q _e exp mg/g	q _e calc mg/g	K ₁ 1/min	R ²	q _e exp mg/g	q _e calc mg/g	K ₂ g/mg×min	R ²
0.5 × 1.0 (0.009 g)	24	23	6×10 ⁻²	0.9915	24	27	2×10 ⁻³	0.9981
1.0 × 1.0 (0.018 g)	14	13	8×10 ⁻²	0.9960	14	17	7×10 ⁻³	0.9999
1.0 × 2.0 (0.033 g)	7	7	6×10 ⁻²	0.9855	7	8	1×10 ⁻²	0.9961
2.0 × 2.0 (0.070 g)	4	3	2×10 ⁻¹	0.9987	4	4	1×10 ⁻¹	0.9995

Table S2: Kinetic parameters referred to experiments in which the adsorbent amount is changed.

ΔH°_{298K} KJ/mol	ΔS°_{298K} J/(mol×K)	ΔG°_{278K} KJ/mol	ΔG°_{298K} KJ/mol	ΔG°_{323K} KJ/mol	ΔG°_{348K} KJ/mol
22±2	125±1	-12±2	-15±1	-18±4	-21±2

Table S3: Thermodynamic parameters

Freundlich Isotherm Model			Temkin Isotherm Model			
K _F (L/mg)	n	R ²	K _T (L/mol)	B ₁	R ²	
4	1.50	0.9392	10	2	0.9730	
Lngumir Isotherm Model			D-R Isotherm Model			
K _L (L/mg)	Q ₀ (mg/g)	R ²	K _{D-R} (mol ² /J ²)	Q ₀ (mg/g)	E(KJ/mol)	R ²
1	10	0.9633	8 × 10 ⁻⁸	6	2.5	0.9610

Table S4: Isotherms parameters