



Photocatalytic removal of pharmaceutical compounds

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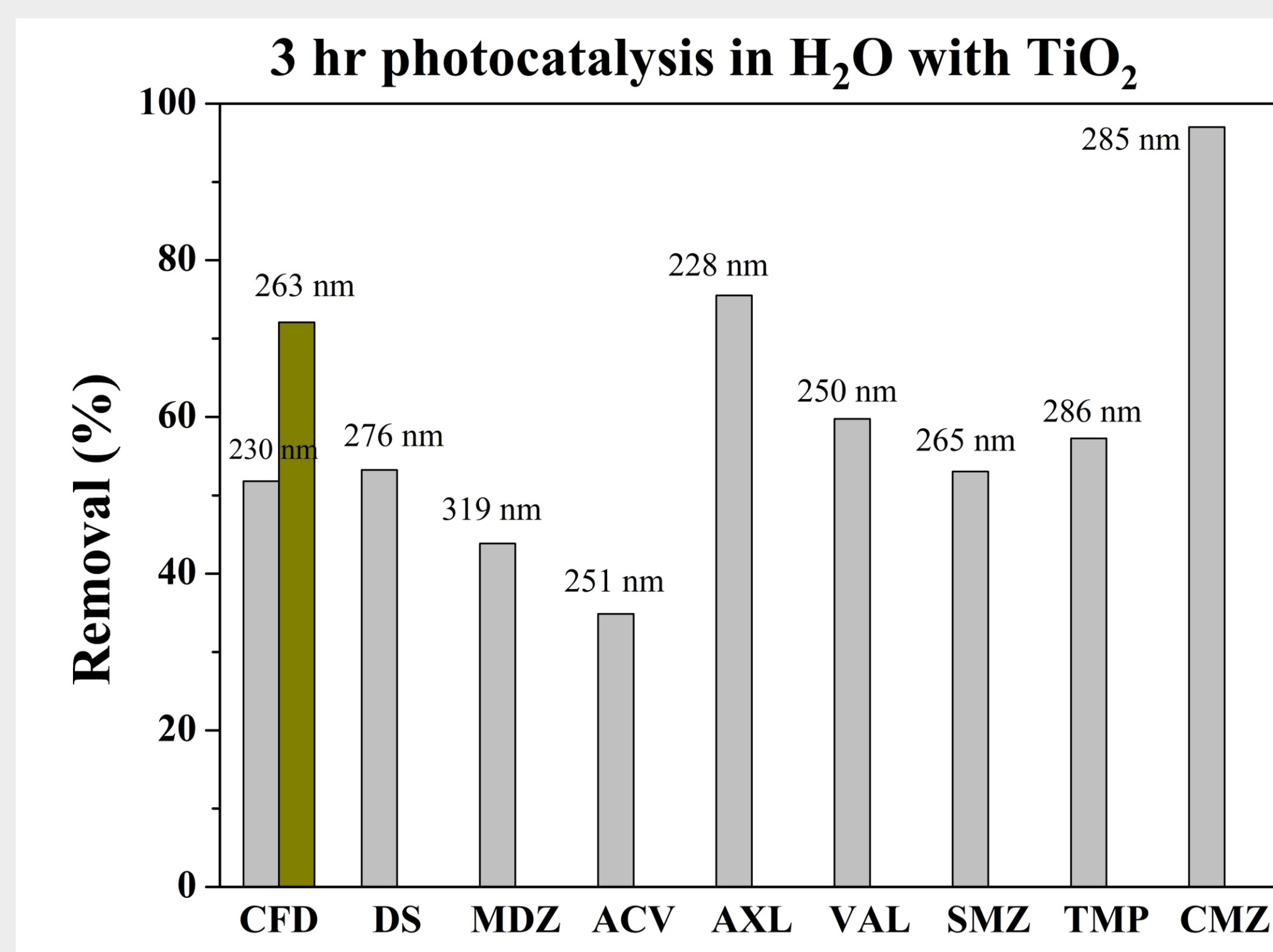
Background

- The excessive use of pharmaceutical compounds and their ineffective removal in wastewater treatment plants has led to the emergence of pharmaceutical residues in aquatic matrices.
- The continuous input of pharmaceuticals and their occurrence as mixtures results in additive and synergistic toxic effects.
- The excretory products accumulated in hospitals and their inappropriate treatment is considered as one of the main pathways of these emerging pollutants into the aquatic receivers.

Objective

- We investigate the removal of nine pharmaceutical drugs of various therapeutic classes by heterogeneous photocatalysis with emphasis on:
 - ✓ the type of the aquatic matrix (pure water or real wastewater),
 - ✓ the photocatalyst type (TiO₂ and ZnO),
 - ✓ the presence of the pharmaceutical compounds as mixtures.

Results



Conditions

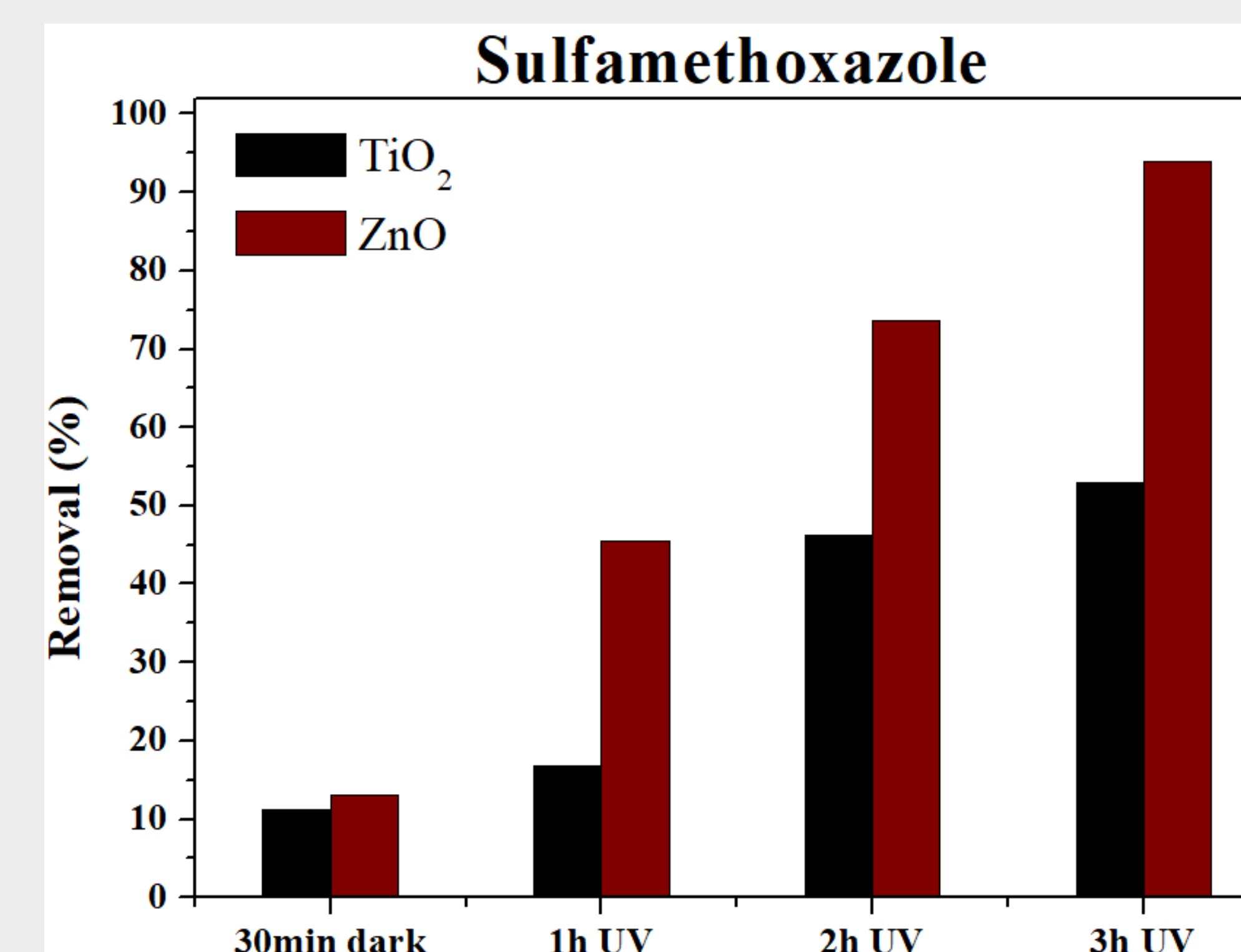
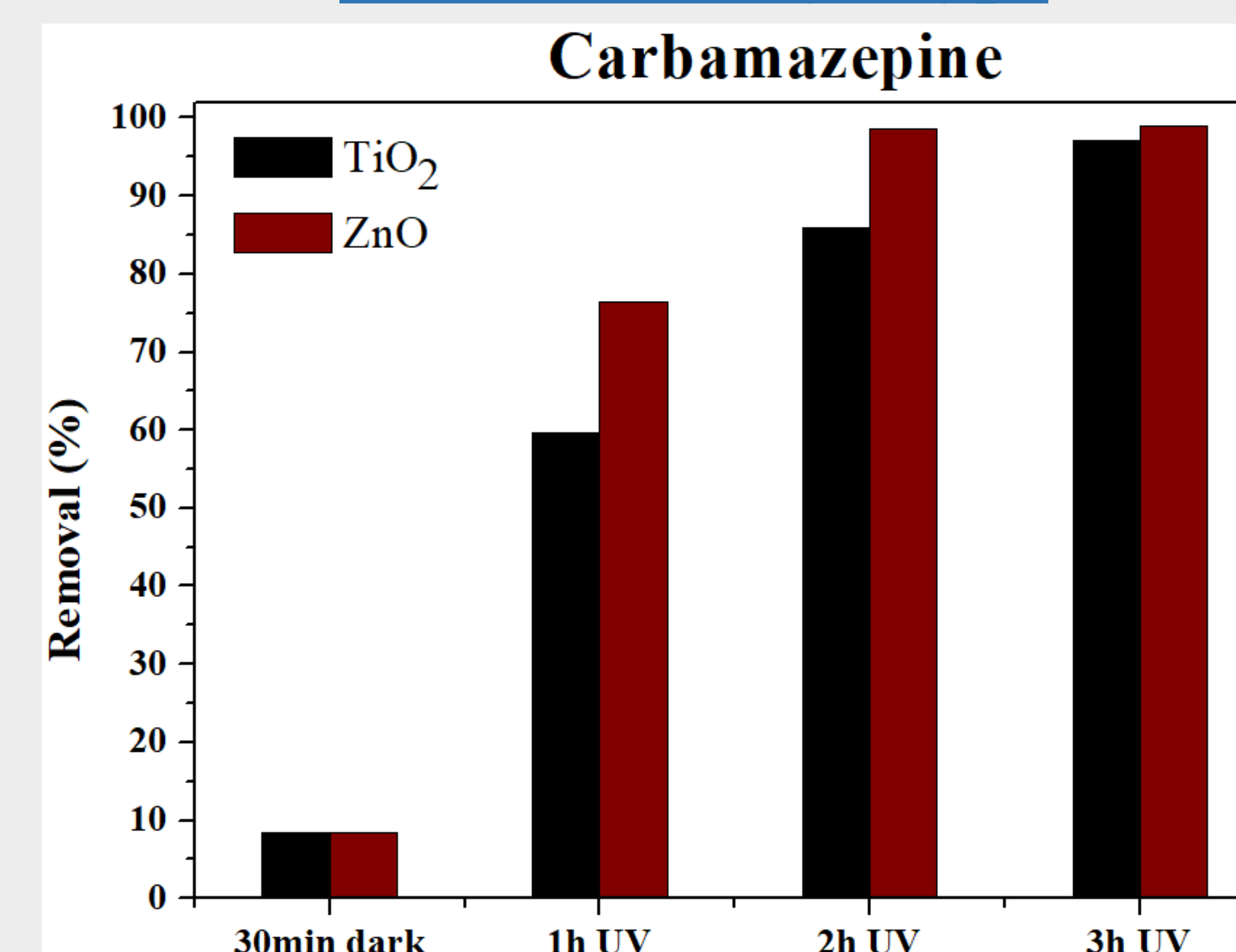
- ✓ Matrix → H₂O
- ✓ 200 ppm TiO₂/ZnO
- ✓ 25mg/L, 5mg/L (CMZ)
- ✓ 30 min in dark & 3 hr UV

Pharmaceutical Compounds

CFD (Cefadroxil)	DS (Diclofenac sodium salt)
AML (Amoxicillin)	VAL (Valsartan)
MDZ (Metronidazole)	SMZ (Sulfamethoxazole)
ACV (Acyclovir)	TMP (Trimethoprim)
	CMZ (Carbamazepine)

- High removal rates, up to complete degradation, were achieved under all conditions.
- Heterogeneous photocatalysis can be considered a promising method for the effective treatment of pharmaceutical compounds and their metabolic products in real hospital wastewaters.

✓ Effect of catalyst type



✓ Matrix effect, mixture of pharmaceuticals

