Strongly coupled 0D tea biomass quantum dots/2D $PbBiO_2Br$ nanosheets for robust photocatalytic degradation of antibiotics: Boosting molecular oxygen activation and mechanism insight

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As depicted in **Table S1**, we have listed the reported $PbBiO_2Br$-based catalysts and their application in the field of environmental remediation. It can be found that tea residue was employed as the carbon source to obtain carbon quantum dots in this research. It can realize the high-value utilization of biomass waste. In addition, the as-prepared T-BCDs/$PbBiO_2Br$ nanocomposite displays the highest photocatalytic performance in the elimination of antibiotics under visible light irradiation.

Table S1 Summary of photocatalytic activities of $PbBiO_2Br$-based photocatalysts

Catalyst	Catalyst characteristics	Reaction condition	Photocatalytic activity	Ref.
$PbBiO_2Br$	porous perovskite-like $PbBiO_2Br$	30 mg catalyst, 100 mL CIP (10 mg L^{-1}), 250 W xenon lamp with a cut-off filter for $\lambda > 400$ nm	87% CIP degradation in 150 min, the reaction rate constant is 0.01381 min^{-1}	[1]

g-C_3N_4/$PbBiO_2Br$	Mesoporous graphitic carbon nitride modified $PbBiO_2Br$ porous microspheres	30 mg catalyst, 100 mL RhB (10 mg L^{-1}), 250 W xenon lamp with a cut-off filter for $\lambda > 400$ nm	99% RhB degradation in 75 min	[2]
CNT/$PbBiO_2Br$ nanocomposite	novel CNTs loading onto $PbBiO_2Br$ nanosheets	30 mg catalyst, 100 mL CIP (10 mg L^{-1}), 250 W xenon lamp with a cut-off filter for $\lambda > 400$ nm	88% CIP degradation in 150 min, the reaction rate constant is 0.01652 min^{-1}	[3]
CQDs/ $PbBiO_2B$/$PbBiO_2Br$ nanocomposite	0D carbon quantum dots modified $PbBiO_2B$/$PbBiO_2Br$ microspheres	50 mg catalyst, 100 mL CIP (10 mg L^{-1}), 250 W xenon lamp with a cut-off filter for $\lambda > 400$ nm	78% CIP degradation in 120 min, the reaction rate constant is 0.0130 min^{-1}	[4]
p-Ag_2O/*n*-$PbBiO_2Br$	couple rod-like Ag_2O with $PbBiO_2Br$ nanosheets	100 mg catalyst, 100 mL MB (20 mg L^{-1}), 500 W xenon lamp with a cut-off filter for $\lambda > 420$ nm	99% MB degradation in 50 min, the reaction rate constant is 0.05982 min^{-1}	[5]
$PbBiO_2Br$	$PbBiO_2Br$ nanosheets	100 mg catalyst, 100 mL MB (20 mg L^{-1}), 500 W xenon lamp with a cut-off filter for $\lambda > 400$ nm	97% MB degradation in 120 min	[6]
T-BCDs/$PbBiO_2Br$ nanocomposite	0D tea biomass quantum dots are uniformly distributed around $PbBiO_2Br$	50 mg catalyst, 100 mL CIP (10 mg L^{-1}), 300 W xenon lamp with a cut-off filter for $\lambda > 400$ nm	88% CIP degradation in 120 min, the reaction rate constant is 0.0197 min^{-1}	this work

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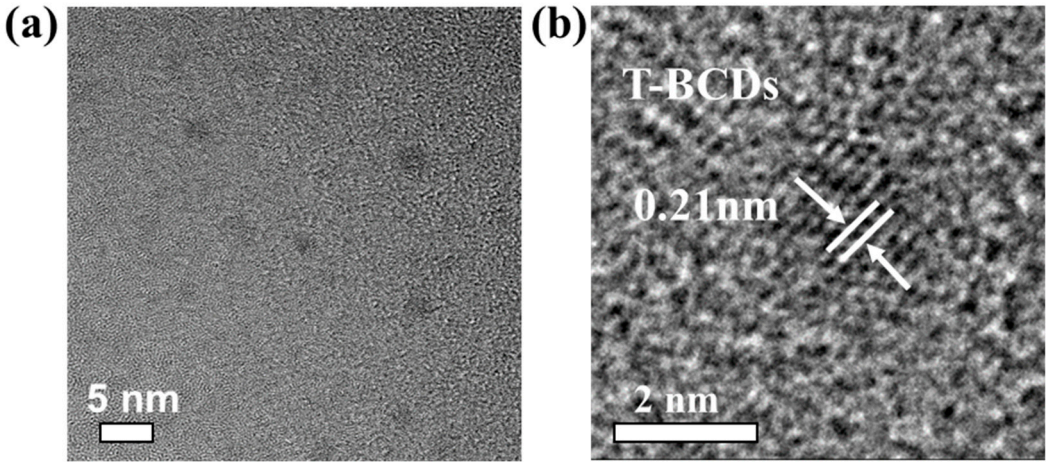


Figure S1. HRTEM images of T-BCDs (a, b)

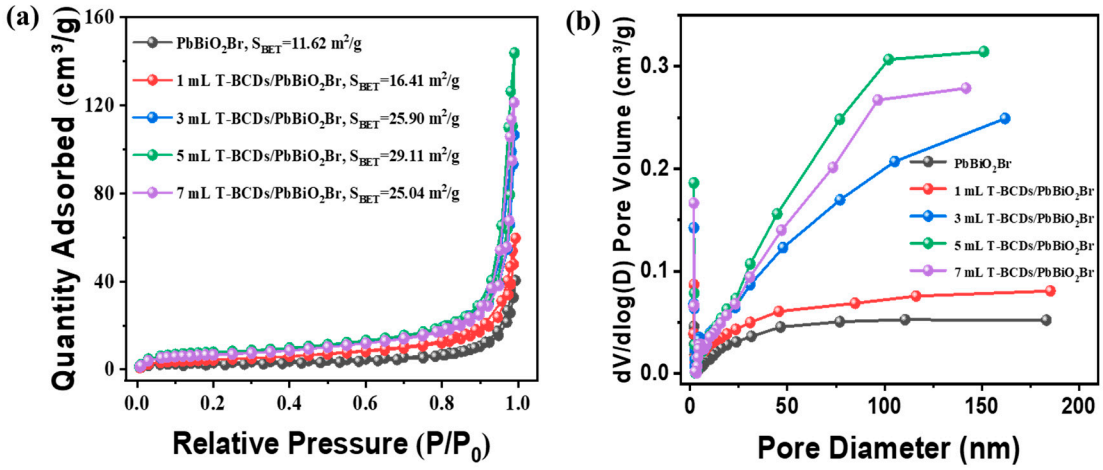


Figure S2. (a) N_2 adsorption-desorption isotherms and (b) pore size distribution plots of $PbBiO_2Br$ and T-BCDs/$PbBiO_2Br$ nanocomposite.

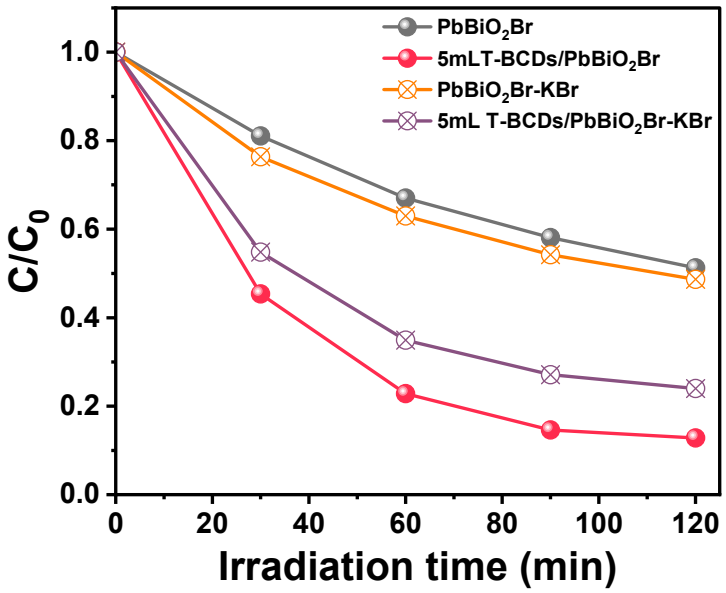


Figure S3. Photocatalytic activities of $PbBiO_2Br$, 5 mL T-BCDs/$PbBiO_2Br$, $PbBiO_2Br$-KBr, and 5 mL T-BCDs/$PbBiO_2Br$-KBr in degrading CIP under visible light irradiation.

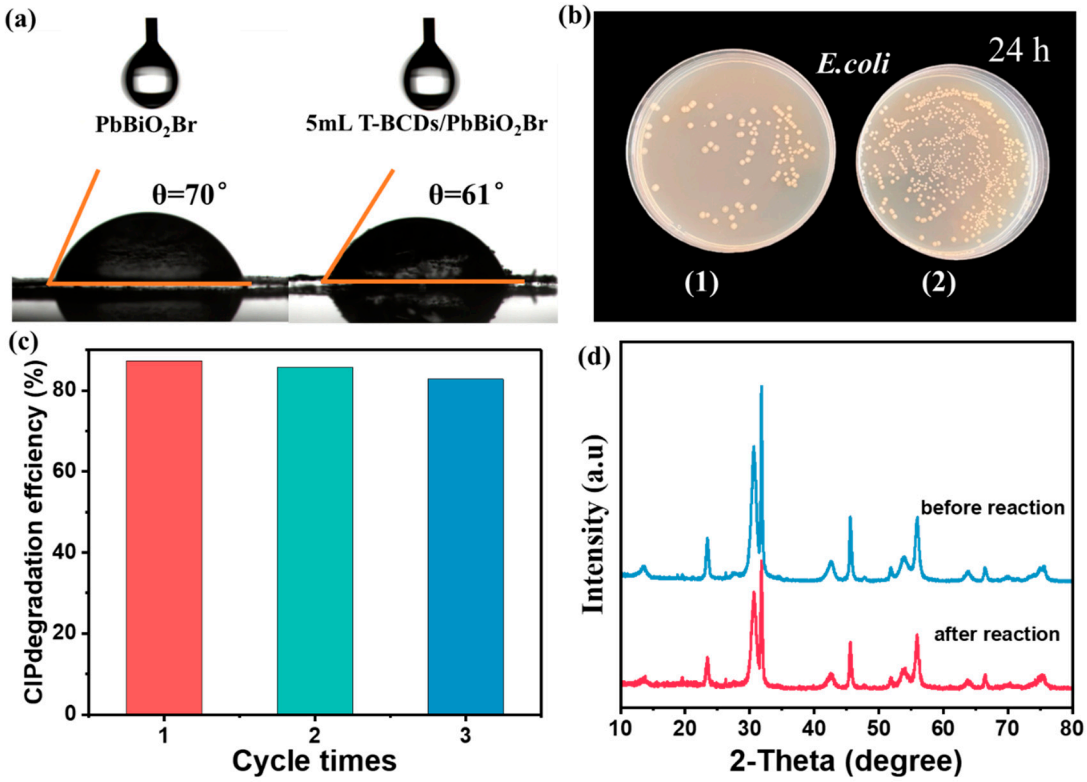


Figure S4. (a) static water contact angle diagram, (b) *E. coli* bio-toxicity experiment of 5 mL T-BCDs/PbBiO2Br, (c) cycling activity diagram for the degradation of CIP, (d) XRD patterns of catalysts after 3 cycles of 5 mL T-BCDs/PbBiO2Br.