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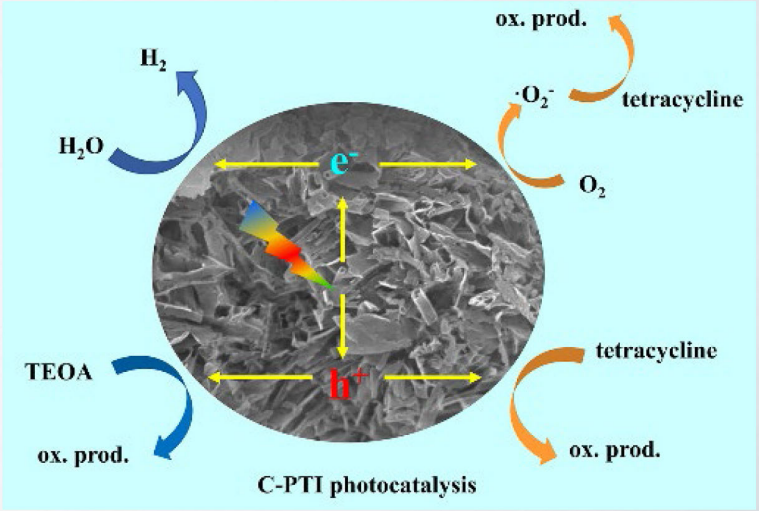
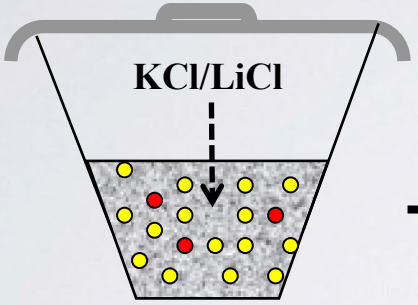
Carbon self-doped polytriazine imide nanotubes with optimized electronic structure for enhanced photocatalytic activity

Key words:

Polytriazine imide, Photocatalysis, Hydrogen evolution, Tetracycline degradation



Method



melamine

glucose

550 °C

One pot

Washed with water

C-PTI
photocatalyst

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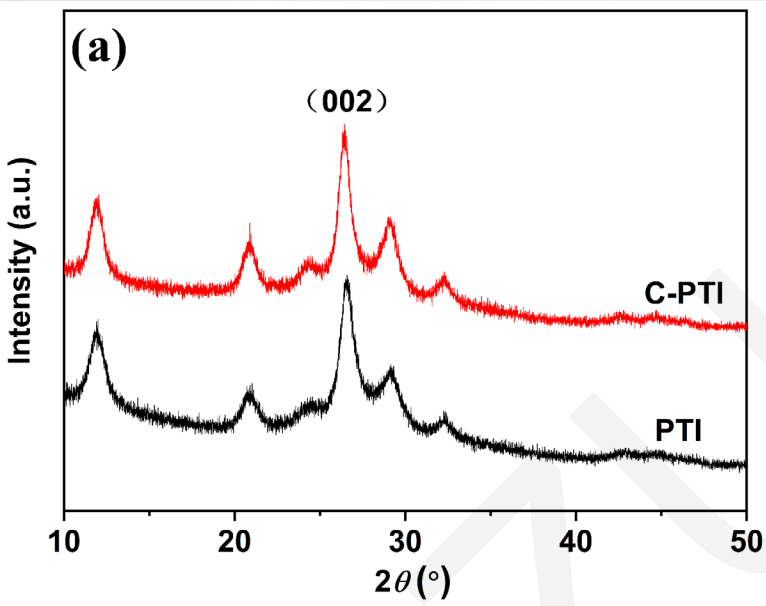
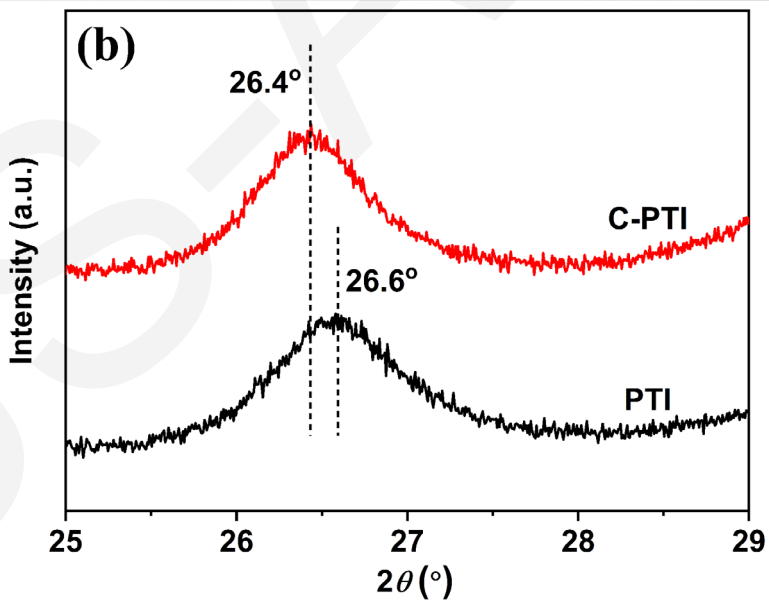
XRD patterns of PTI and C-PTI

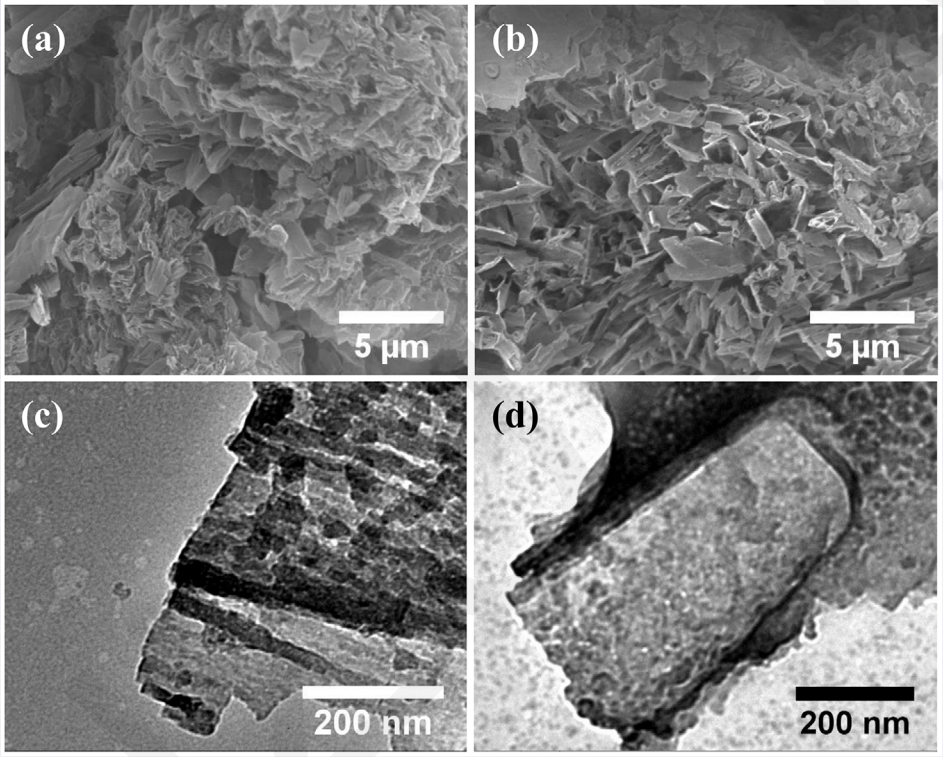




The C-PTI sample exhibited similar diffraction peaks to those of PTI. Somewhat differently, the (002) peak of C-PTI shifted to 26.4º, with an increased distance of 0.337 nm. This crystal distortion might have arisen from carbon doping in PTI.

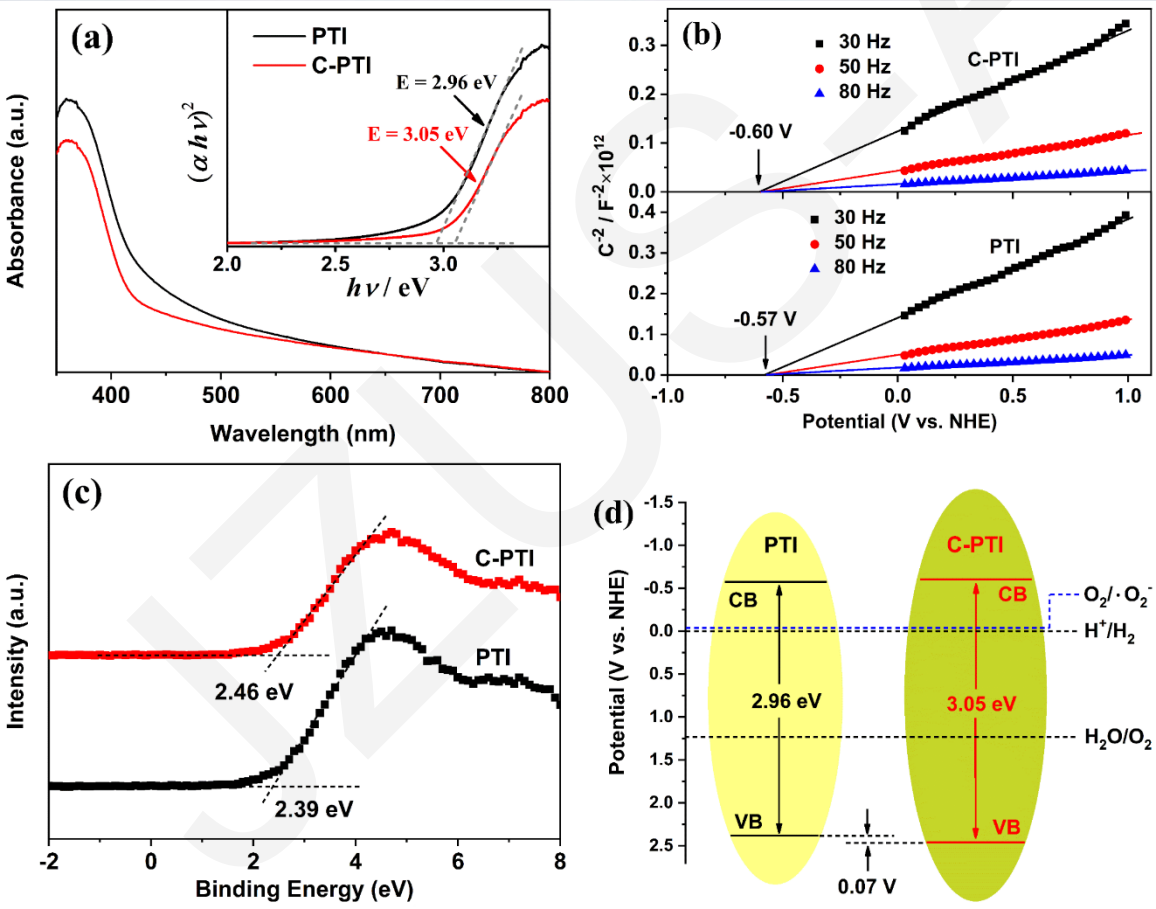
SEM images of (a) PTI and (b) C-PTI.

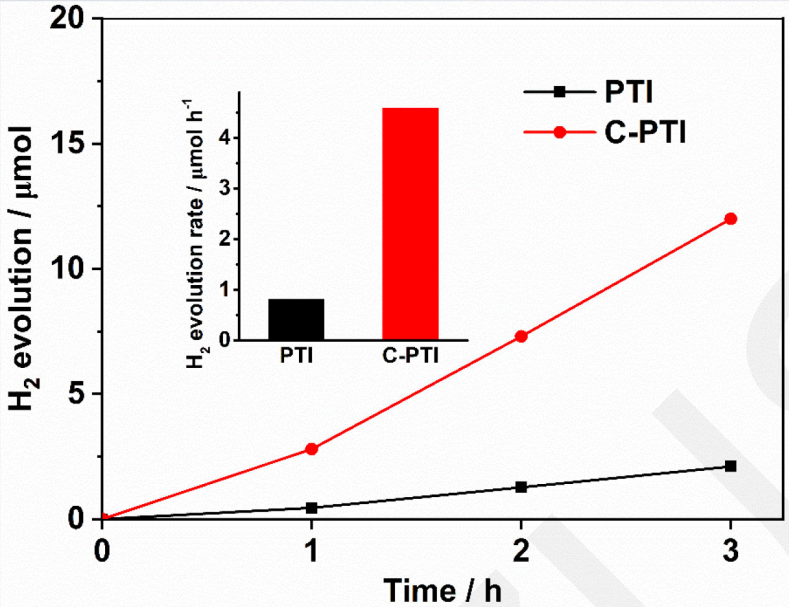
TEM images of (c) PTI and (d) C-PTI.

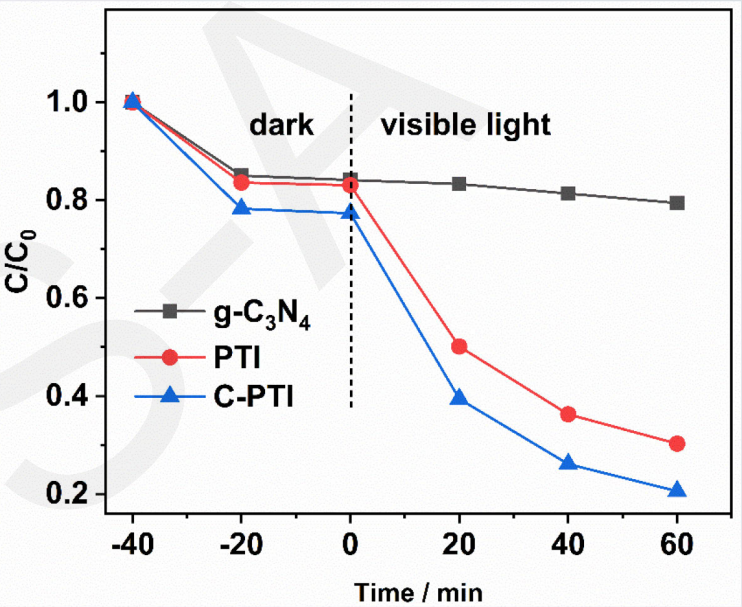


PTI presents a typical cracked nanotube structure. When the carbon source glucose was introduced into the precursor, the obvious hollow nanotubes formed in C-PTI.

(a) UV-vis DRS and the corresponding Tauc plots (insert), (b) Mott-Schottky plots, (c) VB XPS spectra and (d) band structure alignments of PTI and C-PTI.







Compared to PTI, C-PTI exhibits enhanced photocatalytic activities for both hydrogen evolution and tetracycline degradation reactions.

Conclusions

- Carbon self-doped PTI (C-PTI) was synthesized using glucose as the carbon source.
- Carbon self-doping induces electronic structure and morphology changes of C-PTI.
- C-PTI exhibits enhanced photocatalytic H_2 evolution and tetracycline degradation activities.

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