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Flowing water enabled piezoelectric potential of flexible composite film for enhanced photocatalytic performance

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Abstract

Fast charge transfer and low recombination rate are two vital requirements to achieve high photocatalytic activity. In this work, we report the conversion of flowing water energy to piezoelectric potential on a new type of flexible composite film PVDF-$Na_{0.5}Bi_{0.5}TiO_3$-$BiOCl_{0.5}Br_{0.5}$ (PV-N-B) containing PVDF-$Na_{0.5}Bi_{0.5}TiO_3$ (PV-N) substrate and $BiOCl_{0.5}Br_{0.5}$, which significantly boosts the charge transfer of the photocatalytic composite film, resulting in improved photocatalytic capability by 2.33 times. The role of piezoelectric potential in photocatalysis process has been discussed in detail and the results reveal that higher potential output is more beneficial for photocatalytic performance enhancement. Moreover, the photocatalytic degradation intermediates of tetracycline (TC) over PV-N-B were detected by liquid chromatography-mass spectrometer and the possible photodegradation pathway of TC