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# The inhibition of hydrogen and oxygen recombination reaction by halogen atoms on over-all water splitting over Pt-TiO<sub>2</sub> photocatalyst

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## Graphic Abstract

In this paper, we systemically compared the activity difference of H<sub>2</sub> and O<sub>2</sub> recombination reaction over different halogen ions pre-adsorbed Pt-TiO<sub>2</sub> catalysts (F-Pt-TiO<sub>2</sub>, Cl-Pt-TiO<sub>2</sub>, Br-Pt-TiO<sub>2</sub>, I-Pt-TiO<sub>2</sub>). Base on theoretical and experimental investigation, the inhibition roles of halogen elements on H<sub>2</sub> and O<sub>2</sub> recombination was confirmed. By taking advantage of this inhibition role, the over-all water splitting has been achieved over Pt-TiO<sub>2</sub>.

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