

## **Surface chemistry modified by facile liquid phase exfoliation on 2D layered BiOI as photoanode for enhanced oxygen evolution**

BiOI is recognized as a promising photoelectrocatalyst for oxidation reactions, yet its limited photoelectrocatalytic (PEC) activity necessitates innovative strategies to modify its surface chemistry and enhance its PEC properties. In this study, we present a straightforward method to increase photocurrent by exfoliating BiOI microspheres produced through a microwave reaction. Following exfoliation in isopropanol, the BiOI layered materials exhibit a broader range of species, including  $\text{Bi}_2\text{O}_2\text{CO}_3$ ,  $\text{I}^{3-}$ ,  $\text{IO}_3^-$ ,  $\text{Bi}^{5+}$ , and hydroxide species, compared to the original BiOI. These additional species do not directly enhance the PEC oxygen evolution reaction (OER) performance but are consumed or transformed during PEC OER. This process results in more active sites and reduced resistance, ultimately improving the OER performance of the exfoliated BiOI. Over extended chronoamperometry, the exfoliated BiOI demonstrates a photocurrent that is twice as high as that of the BiOI microspheres. Analysis of the species after PEC OER reveals that the  $\text{Bi}^{5+}$  and  $\text{I}^{3-}$  species on BiOI microspheres strongly interact with the BiOI matrix, enhancing the intrinsic PEC properties of the BiOI microspheres along with the remaining  $\text{IO}_3^-$  species.