

Supplementary Information

Surface modification of LaFeO₃ by Co-Pi electrochemical deposition as an efficient photoanode under visible light

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Figurers Captions

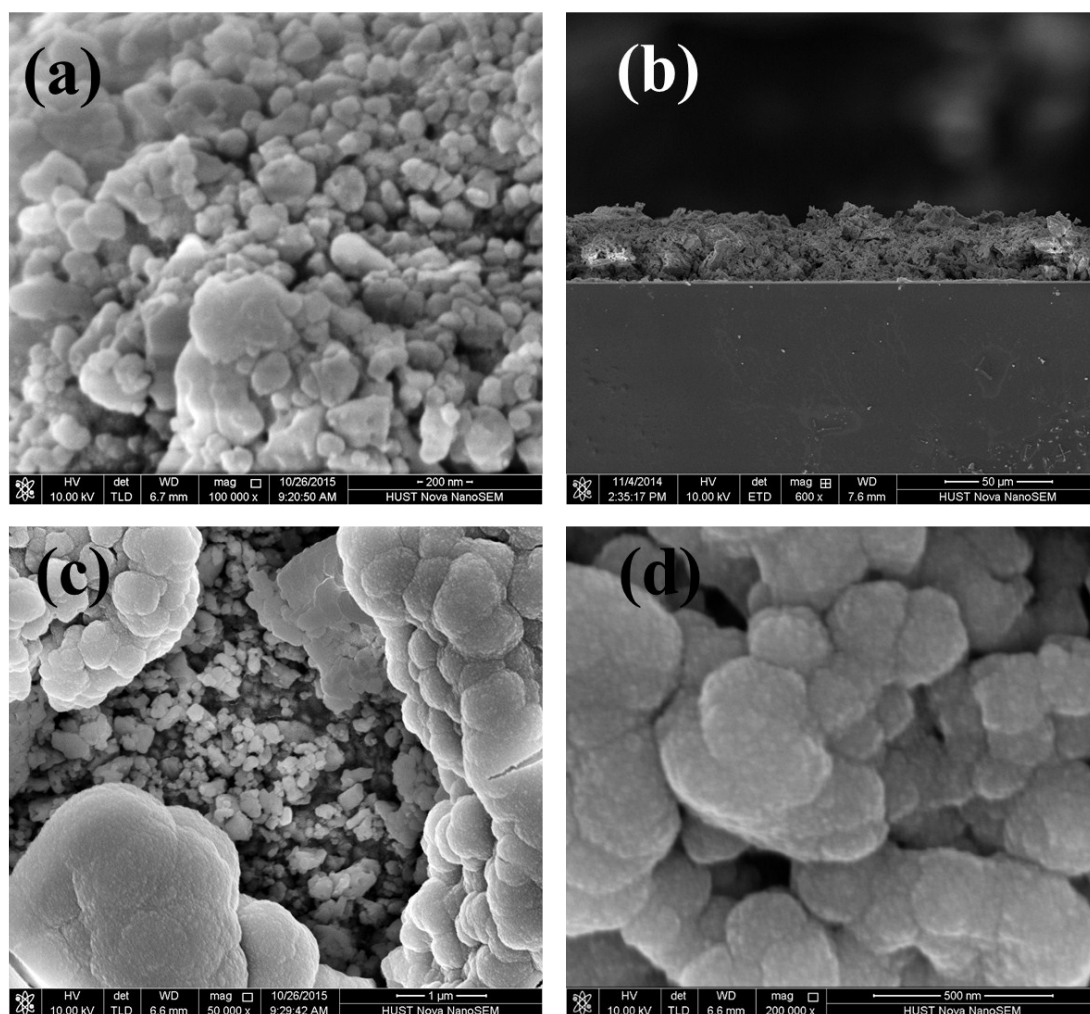


Fig. S1. SEM images (a) High-Resolution SEM images of LaFeO₃ films, (b) the cross view of LaFeO₃ films on FTO, (c) local view of LaFeO₃/Co-Pi 5 with LaFeO₃ and Co-Pi and (d) local view of LaFeO₃/Co-Pi 5 with Co-Pi.

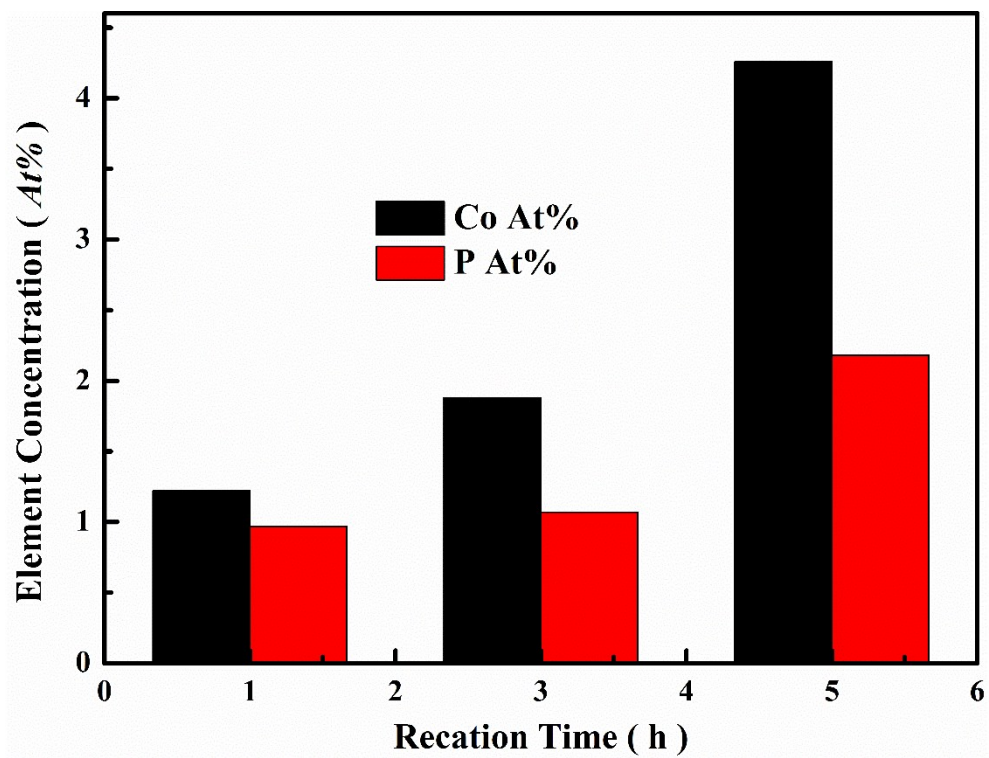


Fig. S2. Co and P atomic concentration of LaFeO₃, LaFeO₃/Co-Pi 1, LaFeO₃/Co-Pi 3 and LaFeO₃/Co-Pi 5 photoelectrode.

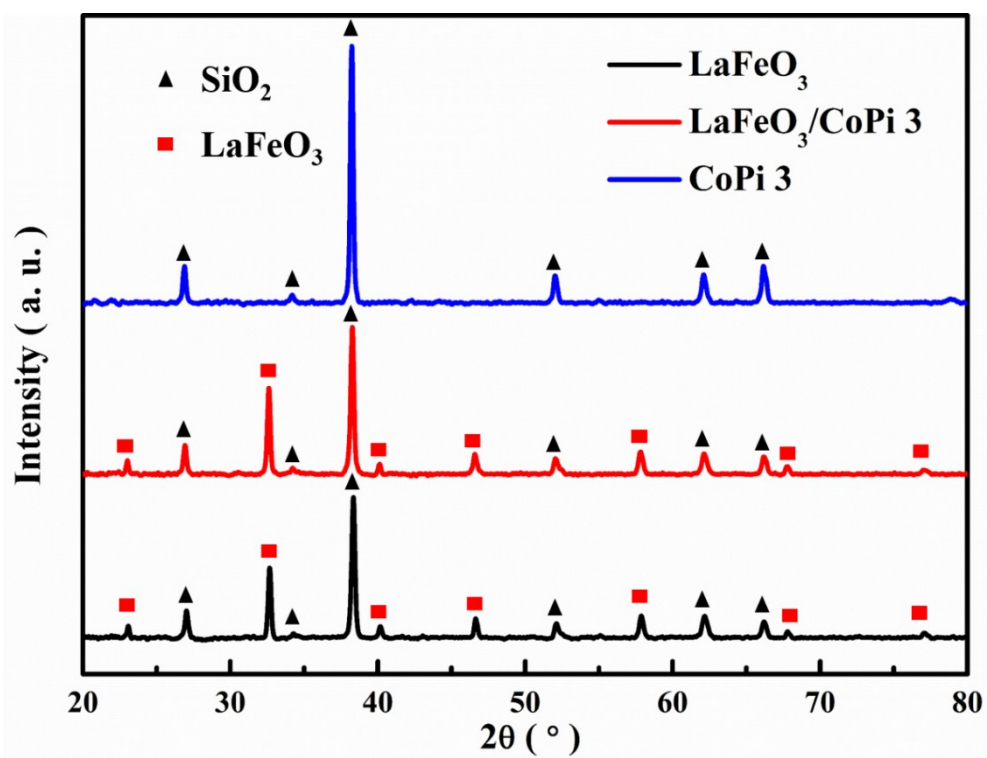


Fig. S3. XRD spectrum of pure LaFeO₃, pure Co-Pi 3 and LaFeO₃/Co-Pi 3.

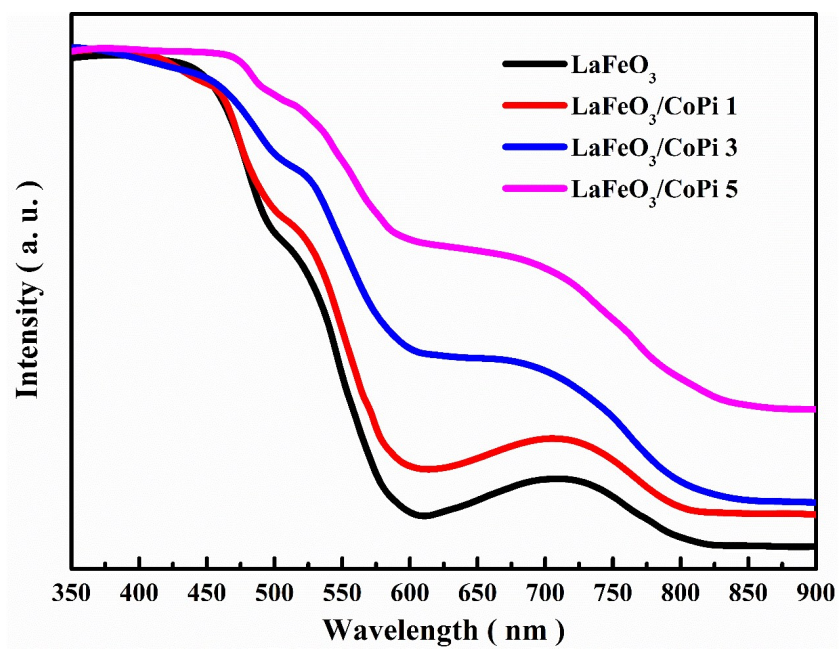


Fig. S4. The UV-vis adsorption spectra of LaFeO₃, LaFeO₃/Co-Pi 1, LaFeO₃/Co-Pi 3 and LaFeO₃/Co-Pi 5 photoelectrode.

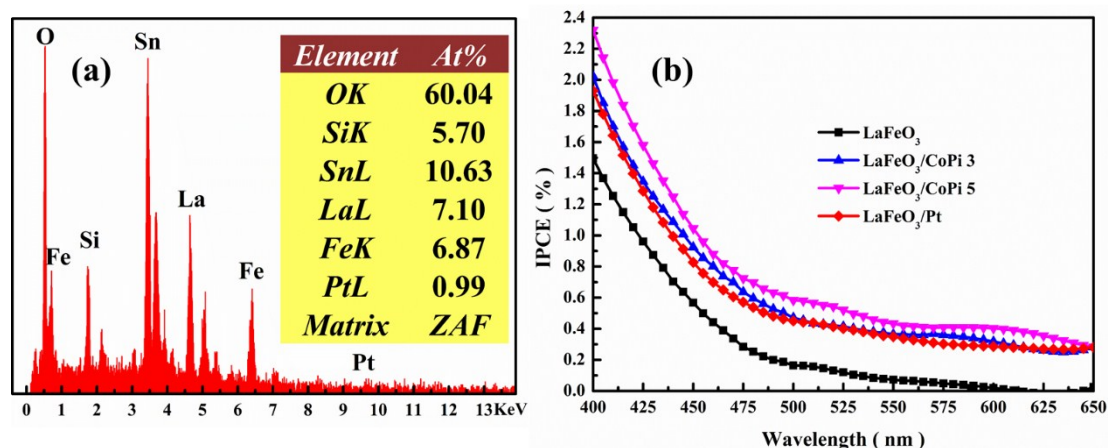


Fig. S5. (a) EDX of LaFeO₃/Pt and (b) IPCE of LaFeO₃/Pt compared with those of LaFeO₃/Co-Pi 3 and 5.

In the water splitting process, novel metal Pt is a commonly used co-catalyst on LaFeO₃ to enhance the hydrogen evolution reaction (HER), while Co-Pi usually improves the oxygen evolution reaction (OER). For a comparison, the ~1% Pt loaded LaFeO₃ (See Fig. S5(a)) has been prepared and its IPCE test (Fig. S5(b)) suggests that the promotion by Pt co-catalyst approaches to that of LaFeO₃/Co-Pi 3 sample, which is about 1.3 times that of the pristine LaFeO₃. This is in a good agreement with Tijare's work [1] where Pt loading promotes the hydrogen generation rate of LaFeO₃ powers by ~1.3 times. These results demonstrate that the PEC performance of Co-Pi coated LaFeO₃ is comparable to that of Pt loaded one, and LaFeO₃/Co-Pi 5 even exhibits a better performance than Pt co-catalyst. Consider the low cost of Co-pi and the abundance of both cobalt and phosphorus, the Co-Pi shows great potential to improve the surface chemical kinetics for practical applications.

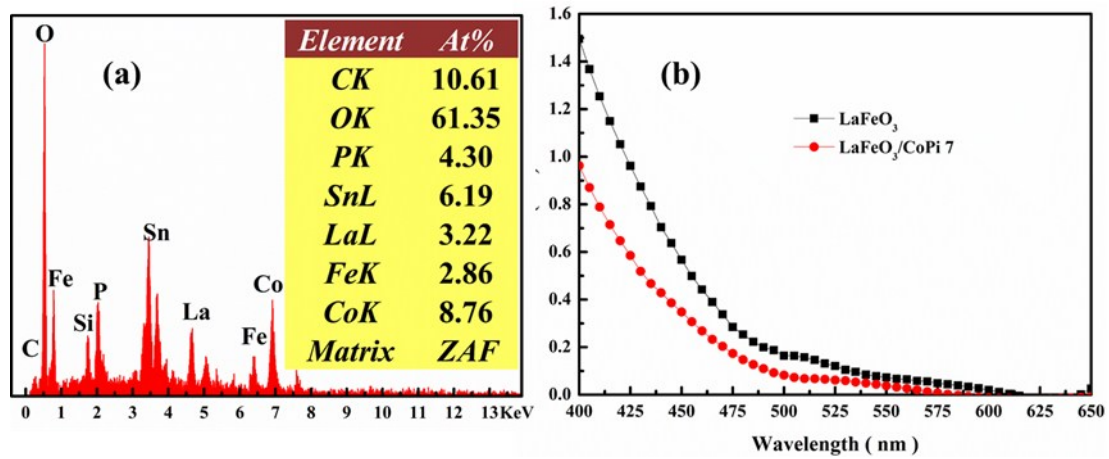


Fig. S6. (a) EDX of LaFeO₃/Co-Pi 7 and (b) IPCE of LaFeO₃/Co-Pi 7 compared with those of LaFeO₃.