

Supportive information

A highly stable CuS and CuS--Pt modified Cu₂O/CuO heterostructure as an efficient photocathode for the hydrogen evolution reaction

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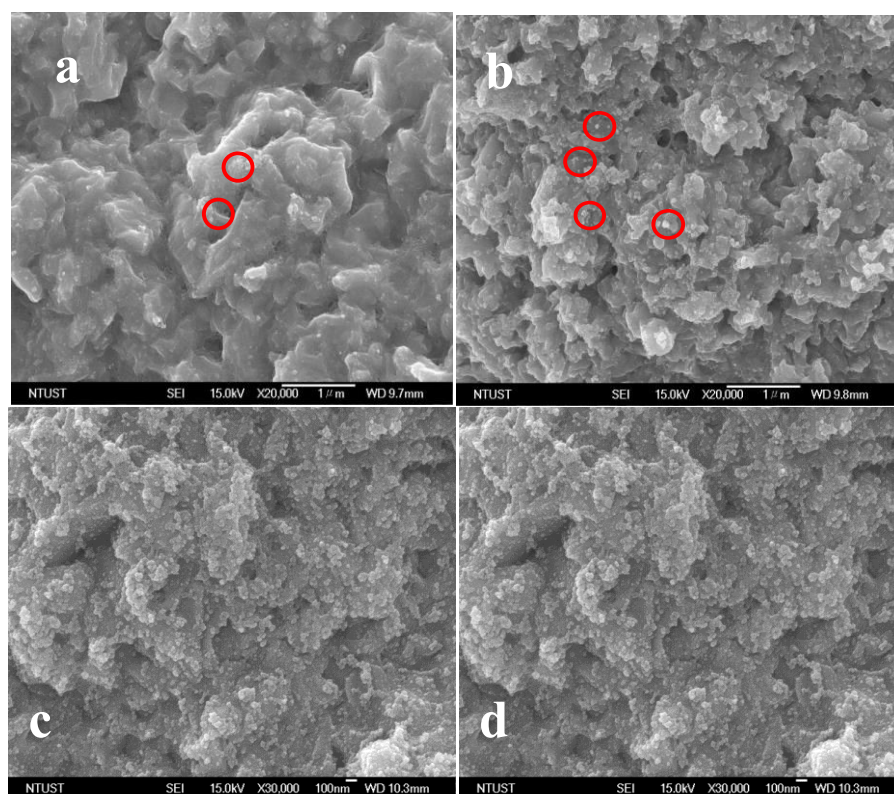


Figure S1. Scanning electron microscopy images of 3 (a) and 6 (b). 12 (c) and 15 (d) times SILAR of CuS on Cu₂O/CuO.

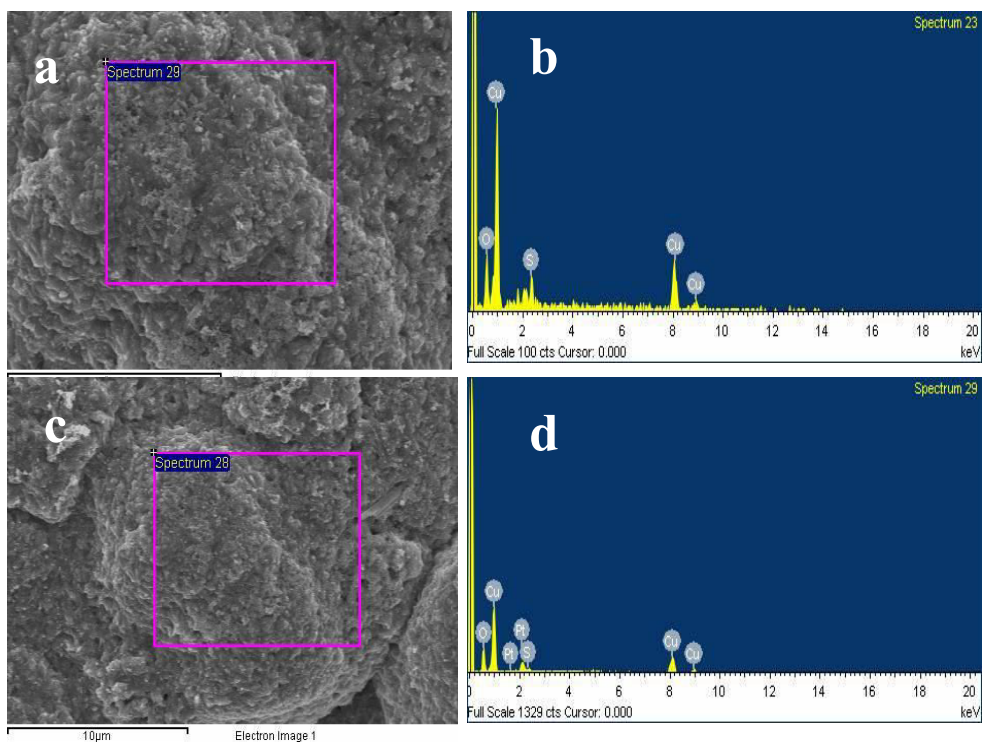
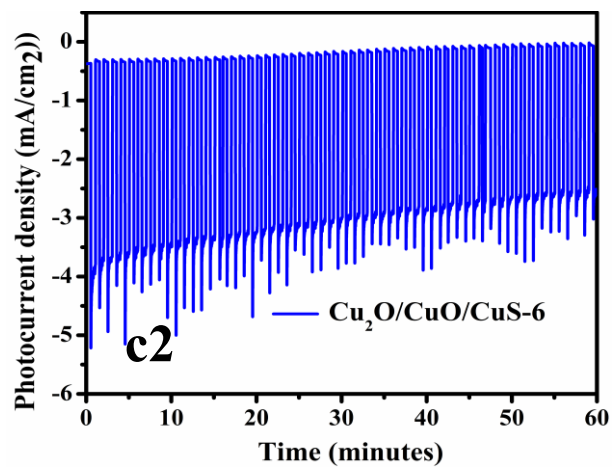
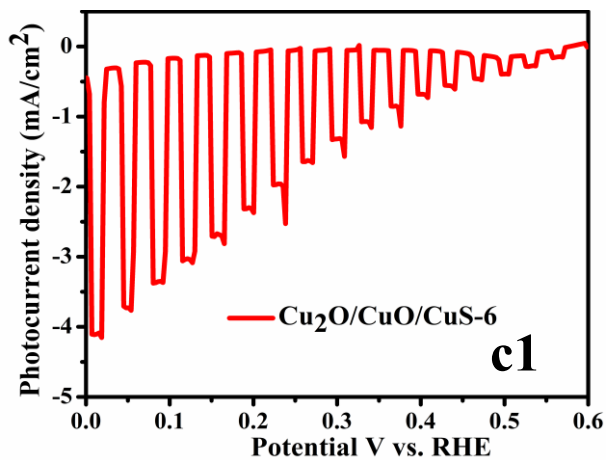
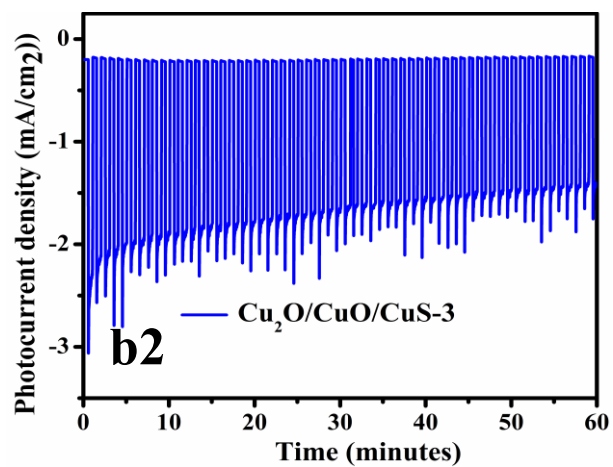
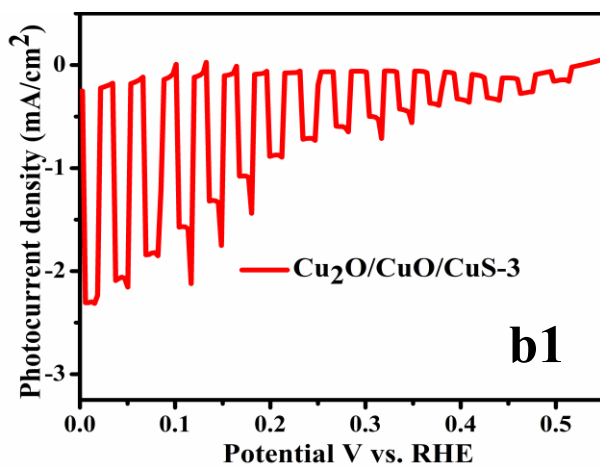
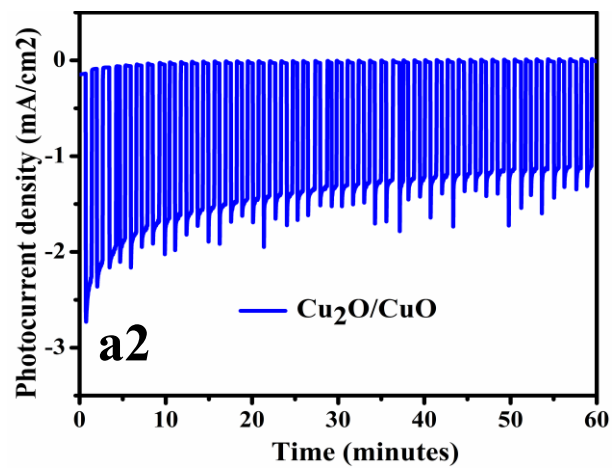
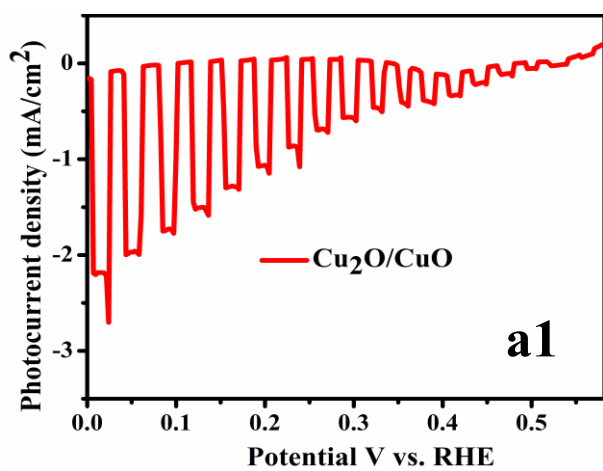


Figure S2. SEM images (a and c) and Typical EDX analysis (b and d) acquired from the $\text{Cu}_2\text{O}/\text{CuO}/\text{CuS-9}$ and $\text{Cu}_2\text{O}/\text{CuO}/\text{CuS-9}/\text{Pt}$ photocathode film. It can be seen that a weak S peak was detected together with Cu and O from the $\text{Cu}_2\text{O}/\text{CuO}/\text{CuS-9}$ while both S and Pt was detected from the $\text{Cu}_2\text{O}/\text{CuO}/\text{CuS-9}/\text{Pt}$.



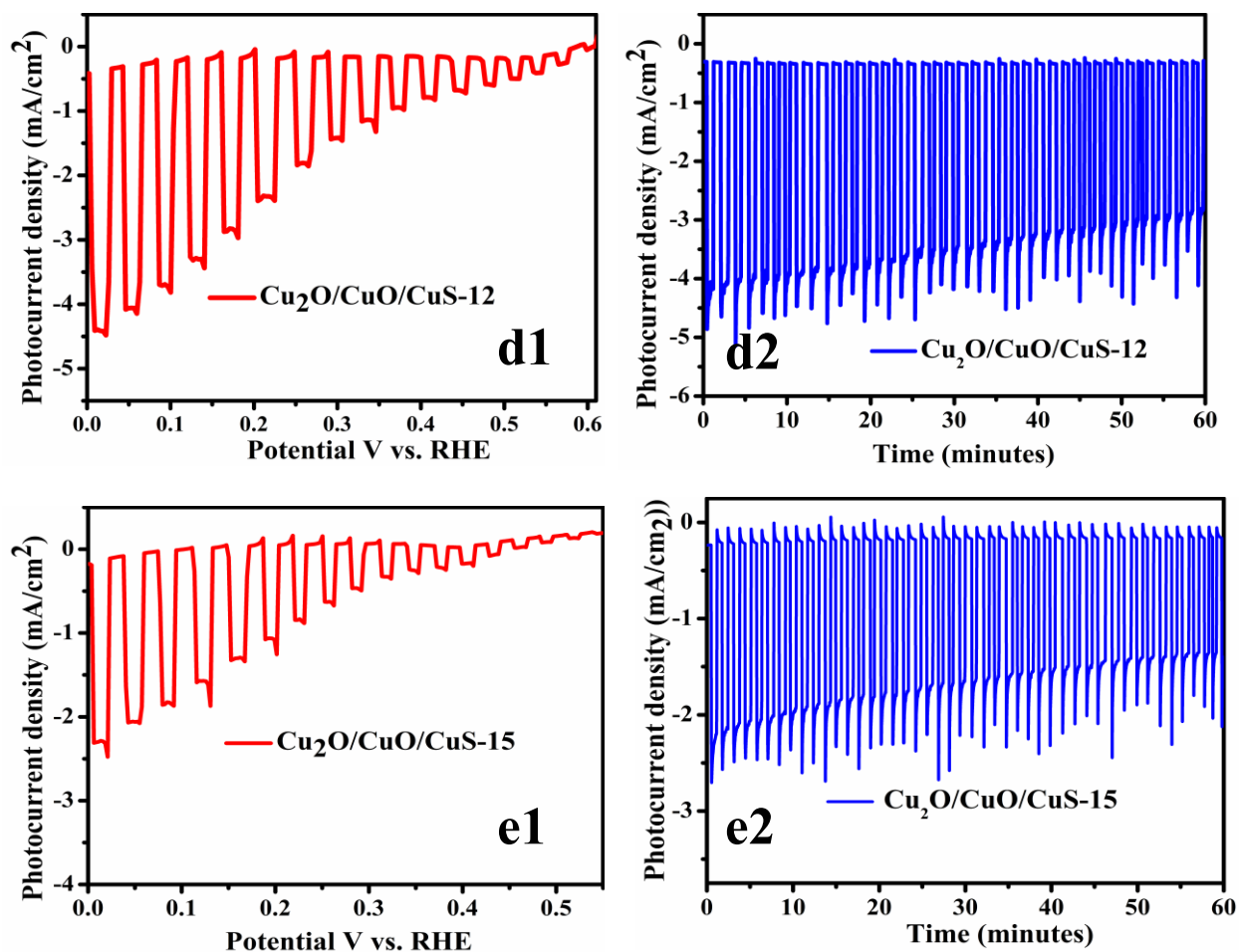


Figure S3. PEC performances and stability measurement of bare Cu₂O/CuO (a1 and a2) Cu₂O/CuO/CuS-3 (b1 and b2), Cu₂O/CuO/CuS-6 (c1 and c2), Cu₂O/CuO/CuS-12 (d1 and d2) and Cu₂O/CuO/CuS-15 (e1 and e2).

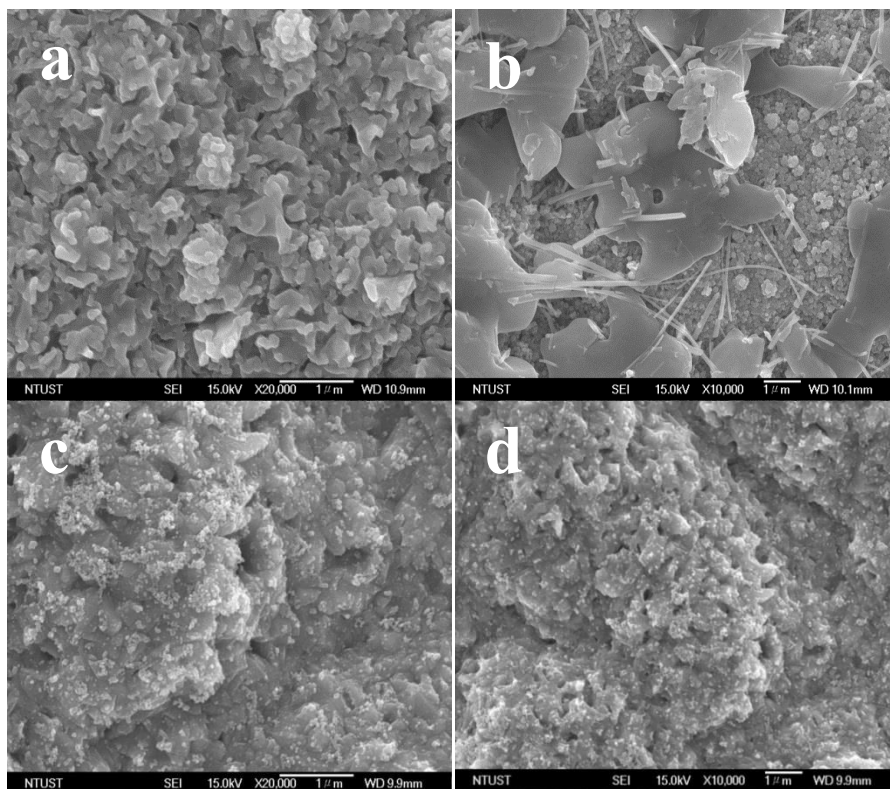


Figure S4 FE SEM images of $\text{Cu}_2\text{O}/\text{CuO}$ and $\text{Cu}_2\text{O}/\text{CuO}/\text{CuS-9}$ before and after 20 minute photo-stability measurement under illumination of AM 1.5 G (a) $\text{Cu}_2\text{O}/\text{CuO}$ before PEC (b) $\text{Cu}_2\text{O}/\text{CuO}$ after PEC (c) $\text{Cu}_2\text{O}/\text{CuO}/\text{CuS-9}$ before PEC and (d) $\text{Cu}_2\text{O}/\text{CuO}/\text{CuS-9}$ after PEC.