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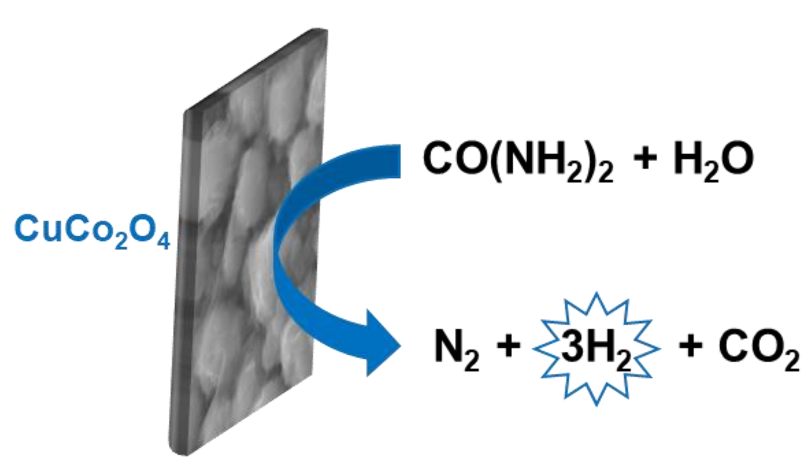
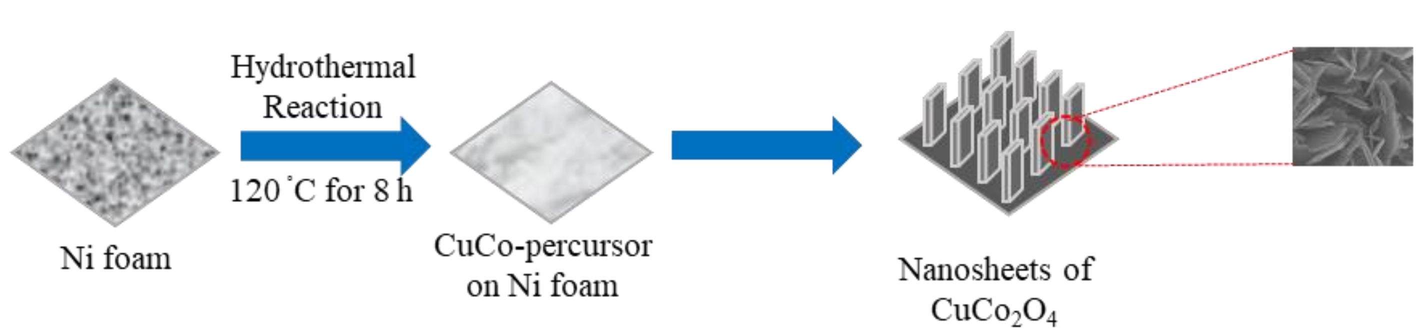
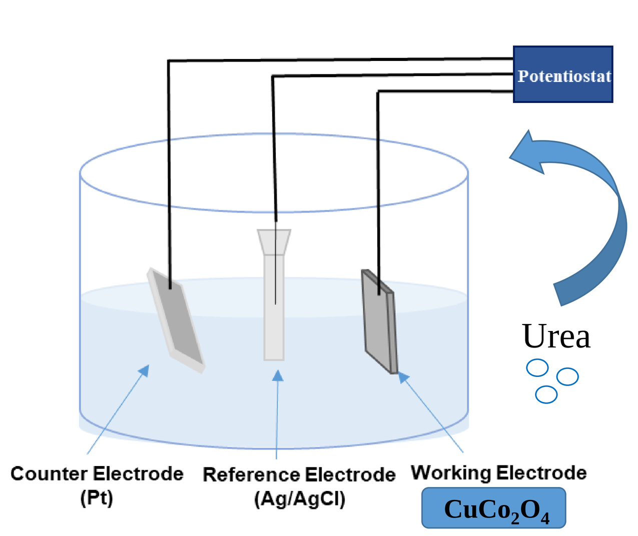
Introduction

- Development of new materials capable of generating green energy with high efficiency and low cost.
- Urea is an abundant waste generated in agricultural land which could be used as a source to generate hydrogen.
- Water splitting occurs at 1.23 V to generate hydrogen, while urea oxidation could provide hydrogen at a lower potential of 0.37 V.
- In this work, it was synthesized nanostructured $CuCo_2O_4$ as an electrocatalyst for urea oxidation to generate hydrogen as a green fuel.

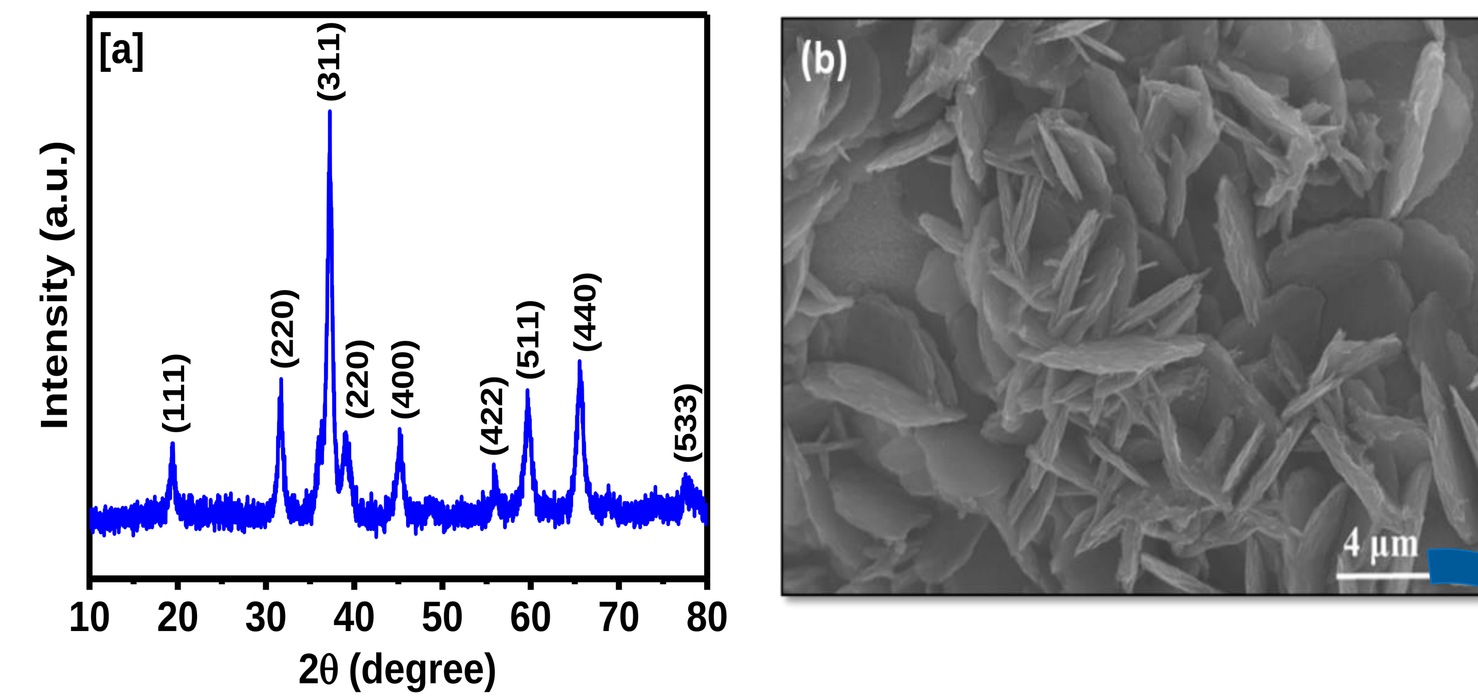


Experimental



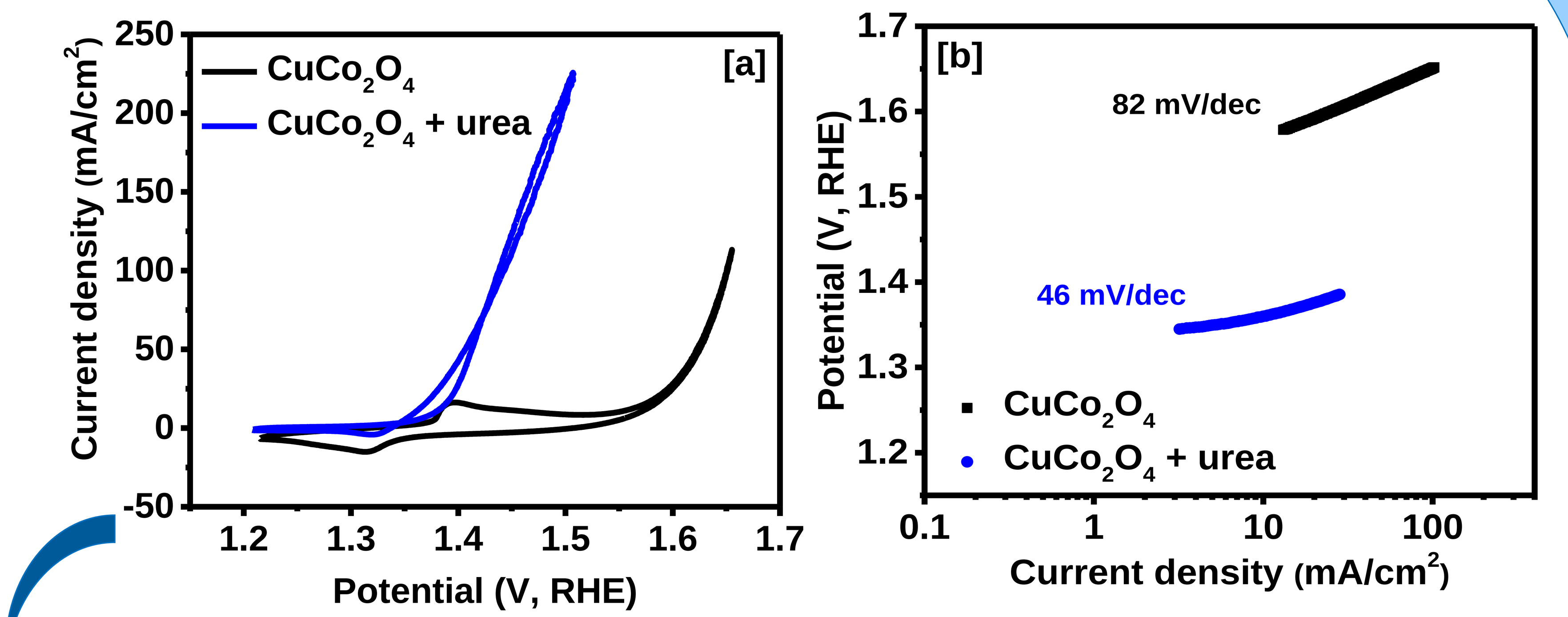


Results and discussion



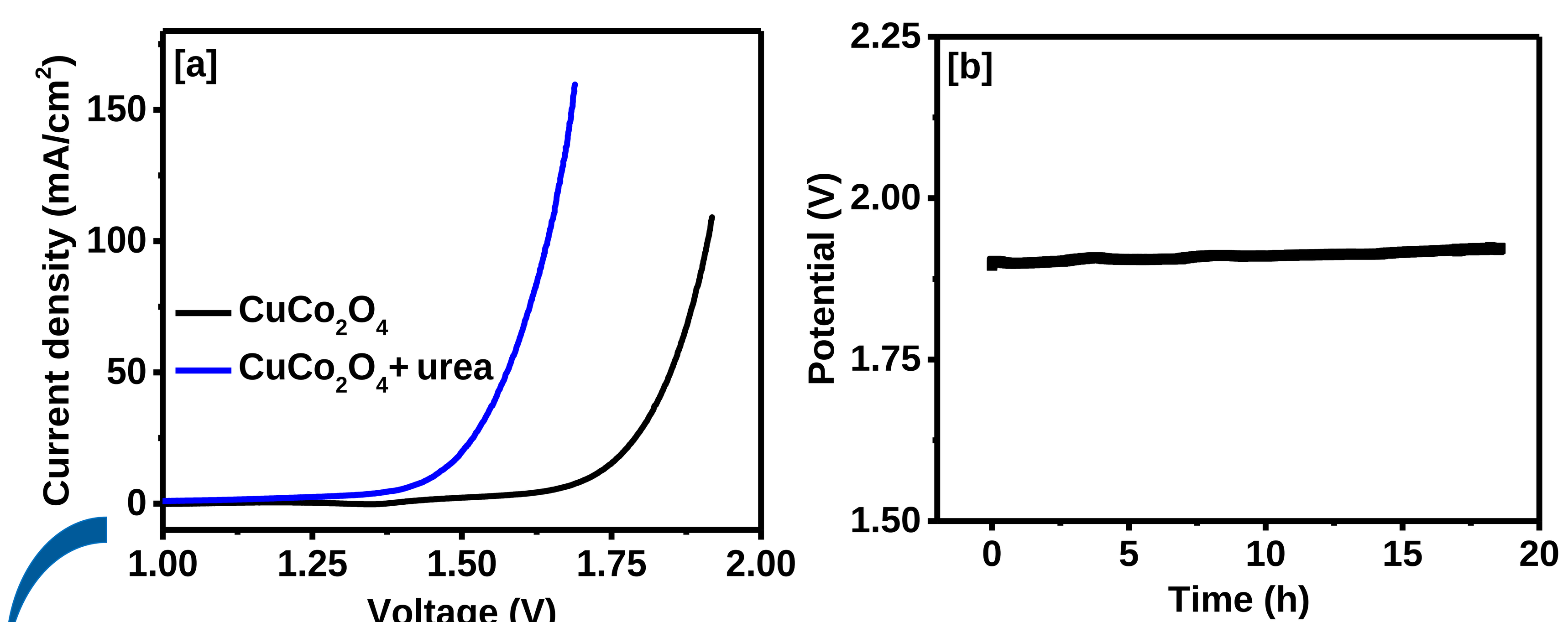
(a) XRD pattern and (b) SEM image of the $CuCo_2O_4$.

Structure composed of nanosheets in different orientations and a smooth surface.



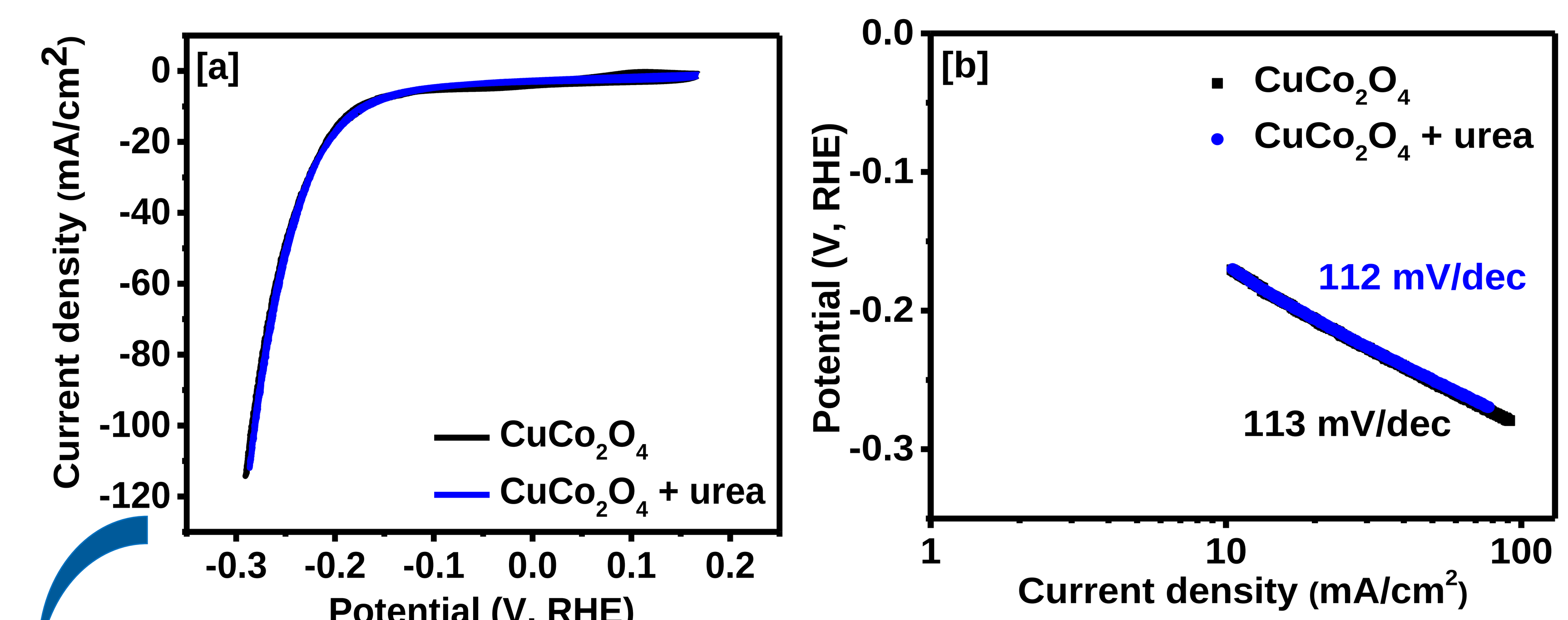
(a) Cyclic voltammetry curves in 1 M KOH with and without 0.33 M urea, and (b) corresponding Tafel slopes.

$CuCo_2O_4$ demanded a potential of **1.36 V**, which is much lower than that without urea.



(a) Polarization curves for $CuCo_2O_4$ in 1 M KOH without and with 0.33 M urea, (b) Chronopotentiometric curve for $CuCo_2O_4$.

Electrolyzer requires a cell voltage of **1.45 V** in urea solution which is 260 mV less than the cell voltage required without urea.



(a) LSV curves of the $CuCo_2O_4$ electrode toward HER in 1.0 M KOH with 0.33 M urea, (b) corresponding Tafel plots.

$CuCo_2O_4$ required a potential of **168 mV** to generate 10 mA/cm².

Conclusion and Future work

✓ $CuCo_2O_4$ in urea oxidation: a solution to eliminate the urea from groundwater systems and environment that are harmful for people; the H_2 production with less energy consumption and low-costs, which helps to solve the crisis energy.

Future work: Make the process even more efficient and develop new multifunctional materials for energy storage and generation.

Acknowledgement

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