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Improvement in hydrogen production activity under visible-light irradiation using Tp-Pa-COF photocatalyst

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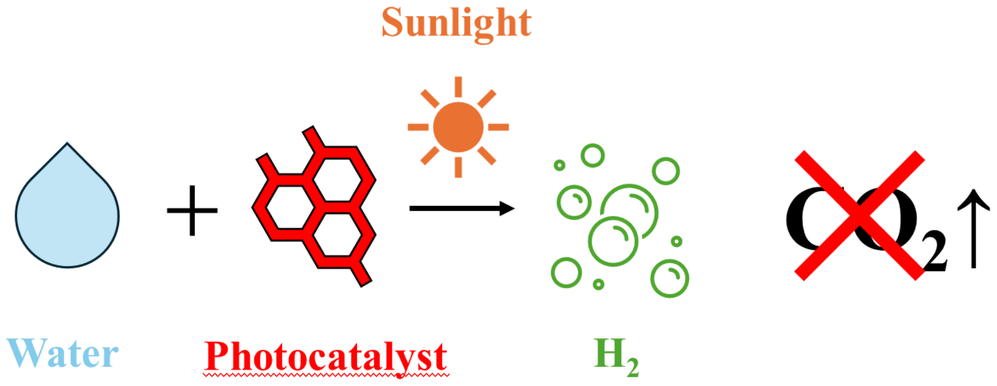
INTRODUCTION & AIM

Rising demand for carbon-free hydrogen production.

CO_2-free method for hydrogen production



AIM

We evaluated the hydrogen production activity of Tp-PaCl_2-COF, a β-ketoenamine-based COF, with particular focus on the temperature conditions during its synthesis.

METHOD

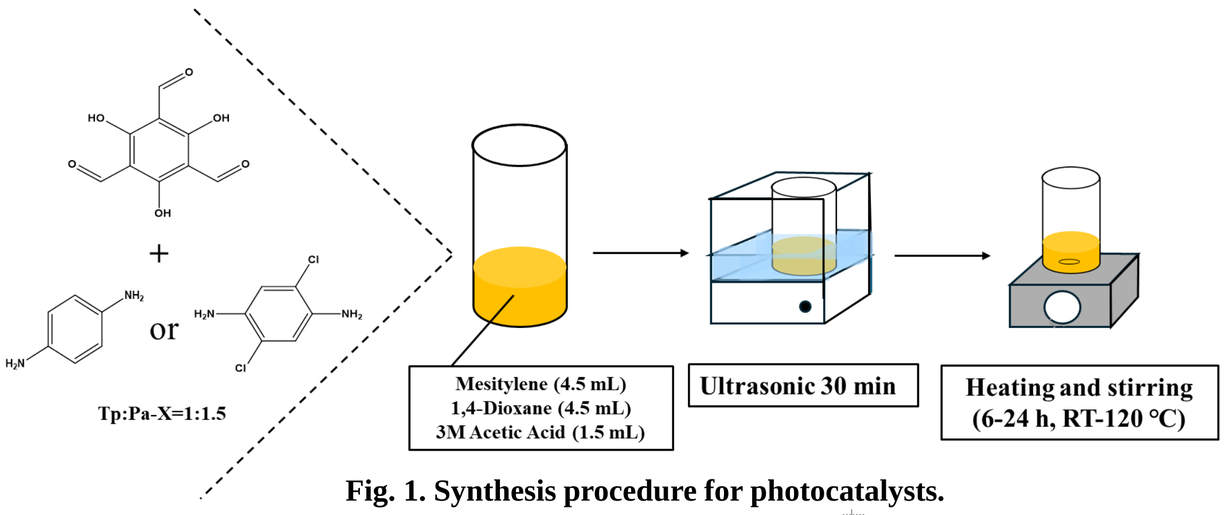


Fig. 1. Synthesis procedure for photocatalysts.

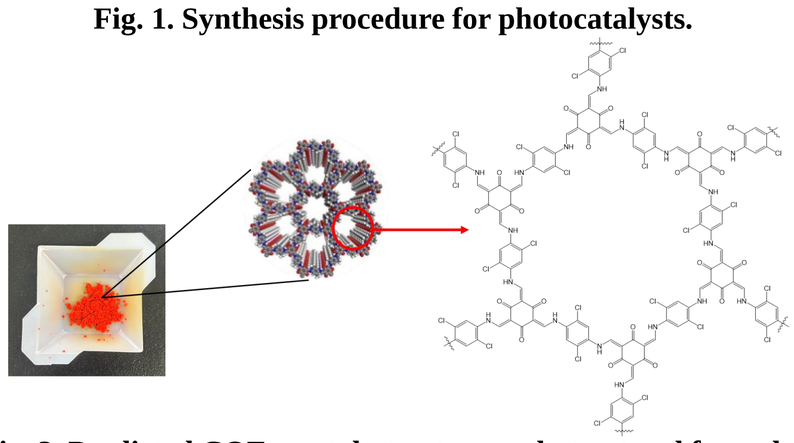
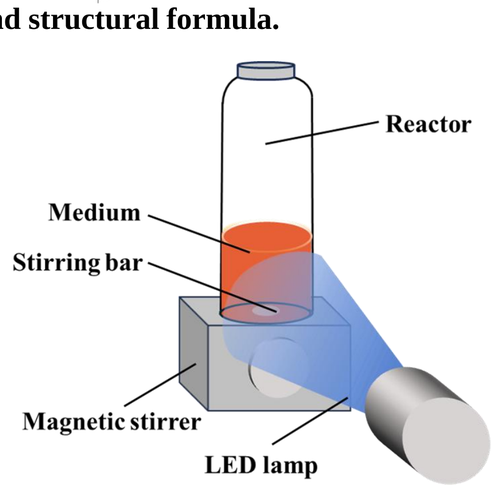


Fig. 2. Predicted COF crystal structure and structural formula.

Photocatalyst	Tp-PaCl_2-COF (10 mg)
Medium	Water (17.2 mL), Sodium Ascorbate (90 mM, 18 mL), H_2PtCl_6 (0.8 mL, 1000 ppm)
Reactor	Pyrex glass vessel (Volume: 123 mL)
Temperature	Room temperature (20 °C)
Light source	LED lamp (λ= 450 nm, 17.5 mW / cm²)
Irradiation time	6 hours
Analysis	Gas chromatography (TCD)

Table 1. Experimental conditions.



RESULTS & DISCUSSION

Hydrogen production activity

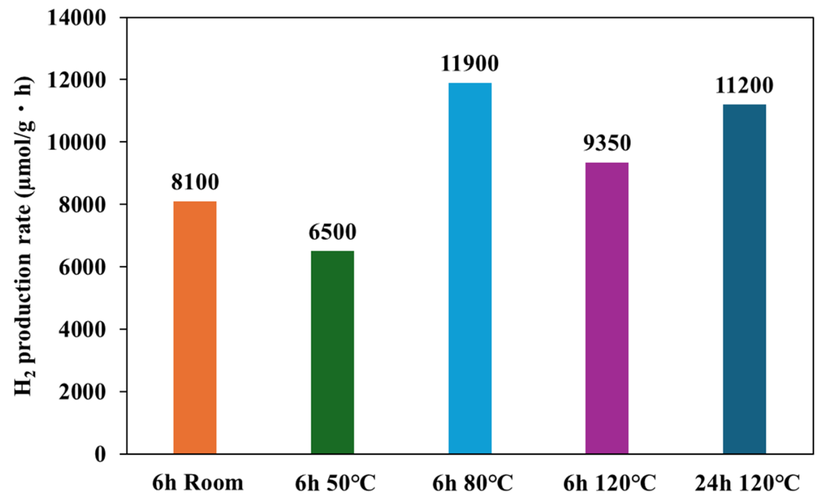


Fig. 3. Effect of temperature and stirring time on the rate of hydrogen production during Tp-PaCl_2-COF synthesis.

SEM

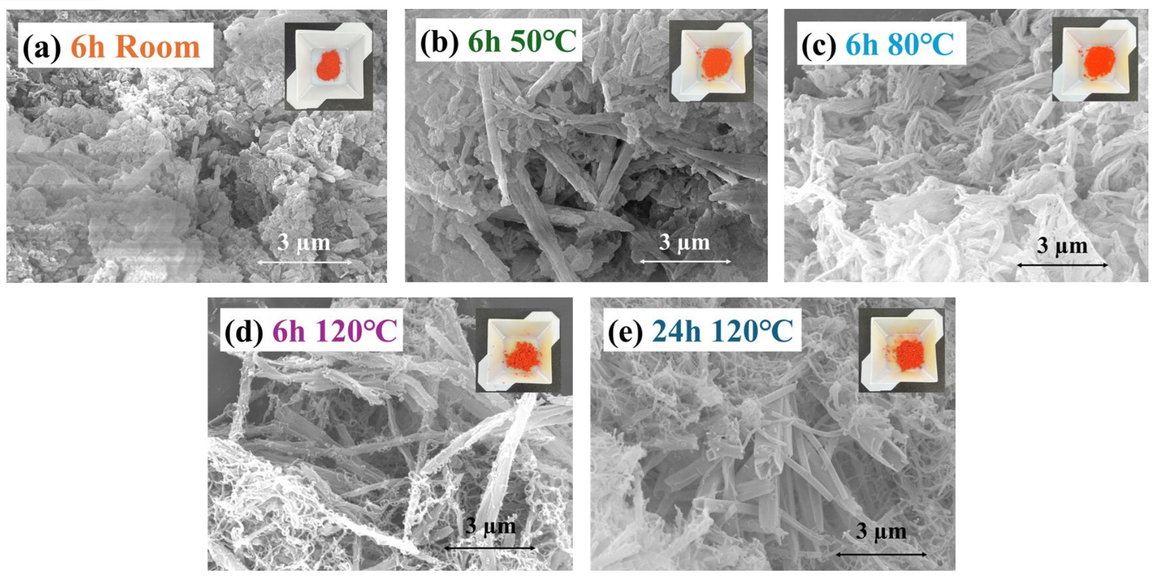


Fig. 4. SEM images of Tp-PaCl_2-COF photocatalysts.

XRD

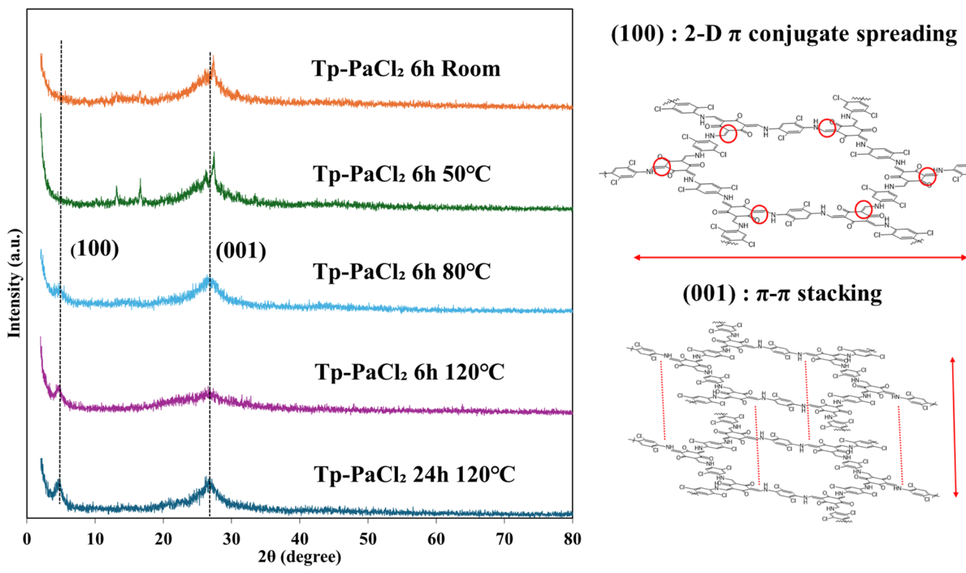


Fig. 5. XRD patterns of Tp-PaCl_2-COF photocatalysts.

CONCLUSION

- **6 hours at 80°C was found to be the highly efficient synthesis condition for the photocatalyst in this study.**
- **The moderately disordered crystalline structure may have facilitated the surface exposure of active sites, thereby contributing to the enhanced catalytic activity.**

FUTURE WORK / REFERENCES

- **Aiming to increase activity by heterojunction with Mxene.**