

Photocatalytic degradation of dyes using TpPa-COF-Cl₂ membrane.

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INTRODUCTION & AIM

Dyes that are highly toxic and difficult to decompose affect human health and the environment. If these can be decolorized with solar energy, it would be a more environmentally friendly approach.

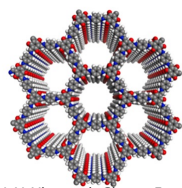
In our research, we use **Covalent organic frameworks (COFs)** as photocatalyst.

GOOD

- No toxic metals
- High activity for dyes

BAD

- Low density and difficult to remove



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This research

The shape of TpPa-COF-Cl₂ was changed from powder to film and its activity against dyes was investigated.

METHOD

Catalyst synthesis

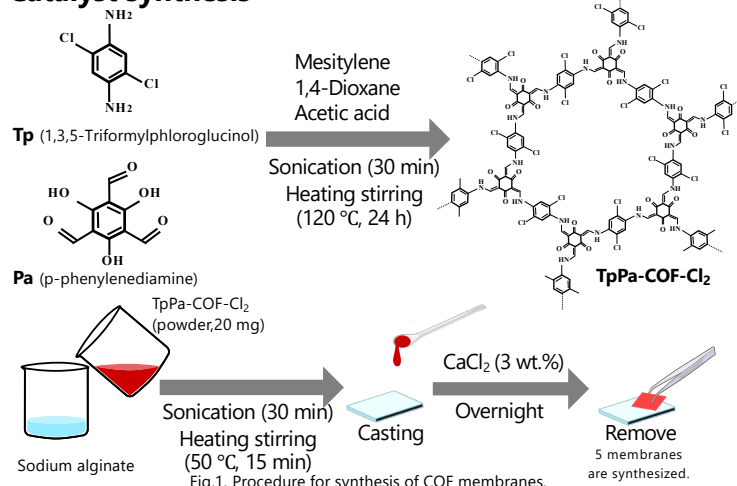


Fig.1. Procedure for synthesis of COF membranes.

Dye degradation

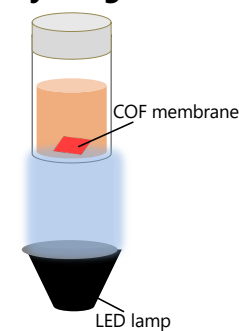


Fig.2. Experimental condition

Table.1 Experimental conditions

Sample	Methyl orange(MO) (5 ppm,35 mL)
Light source	LED lamp ($\lambda = 450 \text{ nm}$)
Temperature	Room temperature
Photocatalyst	TpPa-COF-Cl ₂ membrane (4 mg)
Irradiation time	0-240min
Detection	465 nm

RESULTS & DISCUSSION

We confirmed that adsorption/desorption equilibrium was reached in 30 min, and this was adopted in subsequent experiments.

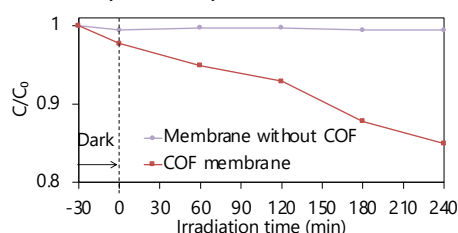


Fig.3. MO decolorization with COF membrane.

The COF membrane was photocatalytic active and slightly decolorized the MO.

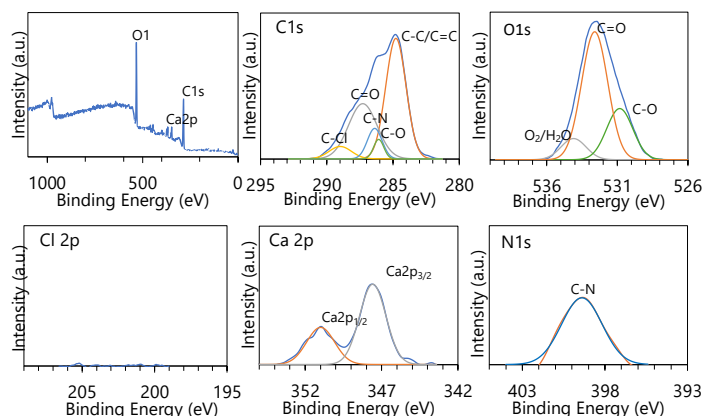


Fig.4. XPS spectra of COF membranes.

The COF was covered by a cross-linking reaction between sodium alginate and calcium ions. Cl was sparsely exposed on the membrane surface.

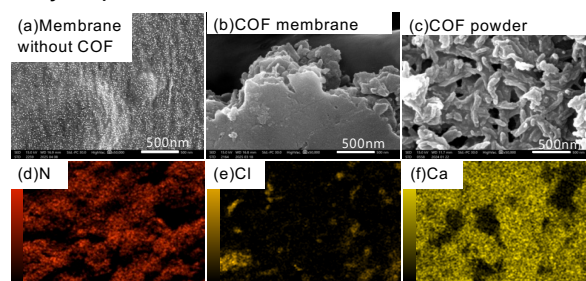


Fig. 5. (a),(b),(c)SEM images and (e),(f),(g)elemental analysis.

CONCLUSION

COF membrane slightly decolorized MO. The decolorization rate of only 20% was probably due to the small amount of COF exposed on the surface.

FUTURE WORK

Increase the amount of COF exposed on the membrane surface to improve the decolorization rate.