

附件四、技術說明表



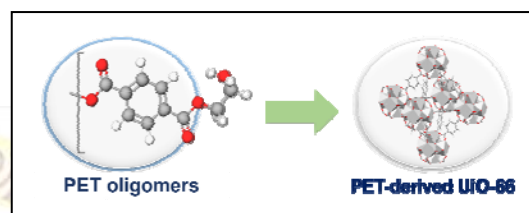
運用塑膠寡聚物合成金屬有機框架材料之合成技術

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市場及需求:

- (1) 廢棄塑膠之高值化再利用可有效解決傳統焚燒與掩埋所衍生之環境問題，具資源循環與永續發展潛力。
- (2) 金屬有機框架材料 (MOF) 之有機配體原料成本高昂，開發低成本且可量產的新型配體來源，有助於推動 MOF 於工業領域之大規模應用。
- (3) 含缺陷之 MOF 材料具備良好催化性能，但現行缺陷引入方式多需經繁複處理，操作不易且難以穩定控制，影響其實用化發展。

技術摘要(含成果):

本技術利用回收聚對苯二甲酸乙二酯 (PET) 之寡聚物作為有機配體，成功合成金屬有機框架材料 (MOF)，所合成之 MOF 具結構性缺陷，暴露更多金屬活性位點，於催化反應中展現優異性能。整體技術兼具環保性、經濟性與工業化潛力，為 MOF 材料開發與塑膠回收提供新方向。

優勢:

- (1) 相較於傳統方法，本技術所採用之原料來源大幅降低 MOF 的製備成本，提升其經濟可行性。
- (2) 所採用之無溶劑合成法無需使用有機溶劑或腐蝕性試劑，製程更具環保性，符合當前對綠色製程的發展趨勢。
- (3) 合成所得之 MOF 材料具較高缺陷密度，暴露更多活性位點，於催化應用中展現優於傳統 MOF 之反應活性。

競爭產品:

- (1) 傳統溶劑熱法合成之 MOF
- (2) 需後處理引入缺陷之 MOF 製程
- (3) 生質來源 MOF (非塑膠) 合成技術

專利現況:

- (1) 本技術目前正在申請中。
- (2) 本研究團隊專注於塑膠處理技術，致力於開發符合環保趨勢之永續應用。

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Synthesis techniques for fabricating metal-organic framework materials using plastic oligomers

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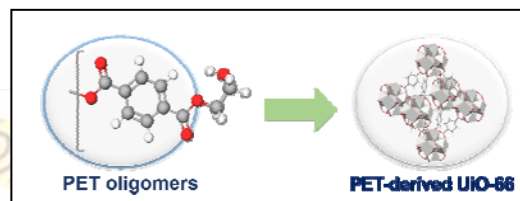
Experience:

Kevin Wu lab website:

<https://fnnkevinwu.wordpress.com/>

Market Needs:

- (1) The upcycling of plastic waste helps address environmental issues from incineration and landfill, offering potential for resource recycling and sustainable development.
- (2) The high cost of organic linkers limits MOF production; developing low-cost, scalable linker sources can enable industrial-scale applications.
- (3) Defective MOFs exhibit excellent catalytic performance, but current defect engineering methods are complex and difficult to control, limiting practical use.



Our Technology:

This technology utilizes oligomers derived from recycled polyethylene terephthalate (PET) as organic linkers to successfully synthesize metal-organic framework (MOF) materials. The resulting MOFs possess structural defects that expose more active metal sites, exhibiting excellent performance in catalytic reactions. This approach offers advantages in environmental sustainability, cost-effectiveness, and industrial scalability, providing a new direction for both MOF development and plastic recycling.

Strength:

- (1) Compared to conventional methods, this technology significantly reduces MOF production costs by using low-cost raw materials, enhancing economic feasibility.
- (2) The solvent-free synthesis avoids the use of organic solvents or corrosive reagents, offering a more environmentally friendly process in line with green chemistry trends.
- (3) The resulting MOF materials exhibit higher defect densities and more exposed active sites, leading to superior catalytic performance compared to traditionally synthesized MOFs.

Competing Products:

- (1) MOFs synthesized via conventional solvothermal methods
- (2) MOF synthesis processes requiring post-treatment to introduce defects
- (3) MOF synthesis using biomass-derived (non-plastic) organic linkers

Intellectual Properties:

- (1) This technology is currently under patent application.
- (2) The research team focuses on plastic treatment technologies, aiming to develop sustainable solutions aligned with environmental trends

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