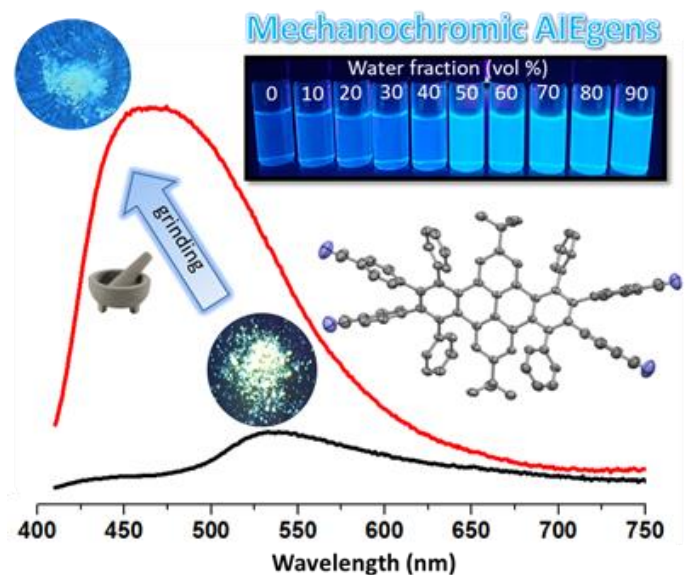


陳嘉祥 副教授

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- ▶ 成功合成聚集誘導發光和機械變色發光之分子
- ▶ 深入探討有機機械變色發光材料的結構與發光性質之關係

為了更好地了解分子結構與光學性質之間的相關性，如聚集誘導發光和機械變色發光，我們分別在芘的 4-和 5-位置以及 4-、5-、9-和 10-位置進行取代反應，合成兩種新的芘衍生物。進一步的在化合物的邊緣引入氫基，以研究這些基團對芘衍生物在溶液和固態中的發光性質的影響。同時研究這些化合物在水/丙酮混合溶液中的螢光性質，發現其具有良好的聚集誘導發光性質且其聚集態的放光最大值相較於分子態有紅位移的現象，歸因於在聚集過程中形成 J-aggregate。仔細研究化合物的晶體結構發現其具有多種分子間作用力，如 C-H... π 和 C-H...N 作用力，有助於化合物展現良好的機械變色發光性能。使用粉末 X 光繞射研究化合物的機械變色發光性質，發現其機械變色發光性質歸因於固態中的 J-aggregate 現象。這些結果為有機機械變色發光材料的結構-發光性質關係提供了相當有價值的資訊，幫助設計高效能有機機械變色發光材料。*Chem. Asian J.*, 2024, 19, e20230091.



【研究團隊】

團隊成員：陳嘉祥副教授、Eldhose V. Varghese 博士、姚佳好

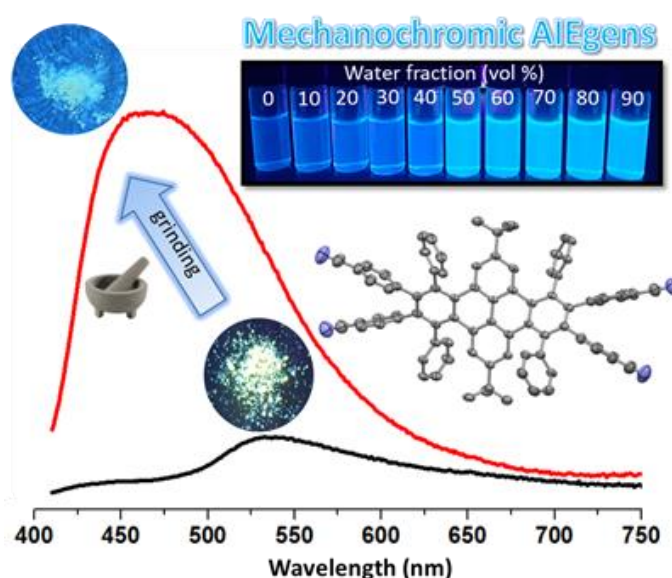
團隊簡介：本團隊致力於聚集誘導發光分子及奈米石墨烯之合成

研究聯繫 Email: chc@kmu.edu.tw



In order to better understand the correlation between molecular structure and optical properties, such as aggregation-induced emission and mechanochromic luminescence, we substituted at the 4- and 5-positions as well as the 4-, 5-, 9-, and 10-positions of pyrene to form two new pyrene derivatives. Additionally, we introduced cyanide groups at the edges of the compounds to investigate the influence of these moieties on the luminescent properties of pyrene derivatives in both solution and solid state. Simultaneously, the fluorescence properties of these compounds in water/acetonitrile mixed solution were studied, revealing excellent aggregation-induced emission properties with a redshift in the emission maximum in the aggregated state compared to the molecular state, attributed to the formation of J-aggregates in the aggregation process. Detailed studies of the crystal structures of the compounds revealed various intermolecular forces, such as C-H... π and C-H...N interactions, contributing to the excellent mechanochromic luminescence performance. Powder X-ray diffraction studies on the mechanochromic luminescence properties of the compounds indicated that the mechanochromic luminescence

is attributed to the J-aggregate phenomenon in the solid state. These results provide valuable information for the structure-luminescence relationship of organic mechanochromic luminescent materials, aiding in the design of high-performance organic mechanochromic luminescent materials. *Chem. Asian J.*, 2024, 19, e20230091.



【Research Team】

Team Members: Chia-Hsiang Chen, Eldhose V. Varghese, Chia-Yu Yao

Research Team Introduction: Our team is dedicated to the synthesis of aggregation-induced emission molecules and nanographene.

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