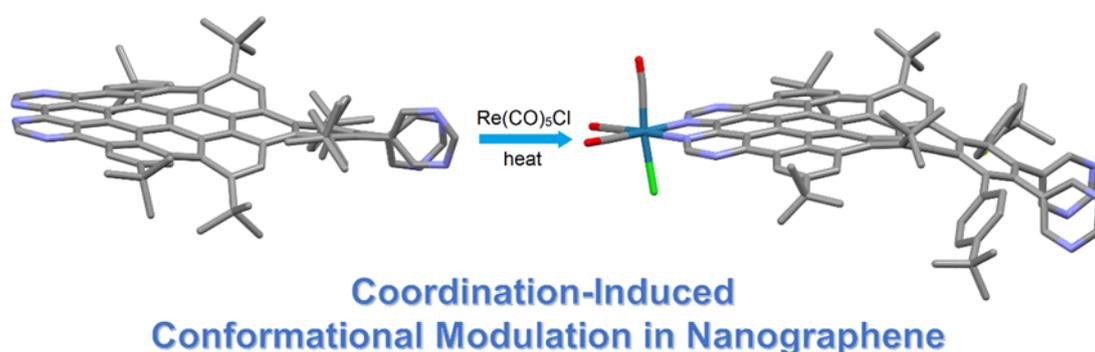




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奈米石墨烯由於具備延伸的 π 共軛系統、可調控的 HOMO - LUMO 能隙以及在光電化學中的應用潛力，近年來備受關注。其分子構型與光學活性對其電子、機械與光學性質具有關鍵影響。然而，針對金屬配位對奈米石墨烯構型所造成的影響，目前仍缺乏系統性的深入研究。在本研究中，我們採用自下而上的合成策略 (bottom-up approach) 製備氮摻雜奈米石墨烯分子，並透過金屬配位實現其光學活性的轉換。我們設計並合成了一系列結構上僅相差一個碳 - 碳鍵的氮摻雜奈米石墨烯衍生物，並製備相對應的銻金屬錯合物。透過多種光譜與 X 光單晶繞射分析，比較氮摻雜奈米石墨烯配位前後的分子結構，驗證其骨架於金屬配位後產生顯著的構型與光學活性變化。此外，我們進一步評估奈米石墨烯銻金屬錯合物在均相電催化析氫反應中的催化活性。結果顯示，在微酸性條件 (1.5 mM 醋酸) 下，其能在僅 133 mV 的低過電位下催化氫氣產生，展現其在能源與催化應用的潛力。





【具體成果】

奈米石墨烯銻金屬化合物能在較低過電位下催化氫氣產生，展現其在能源與催化應用的潛力。



【研究團隊】

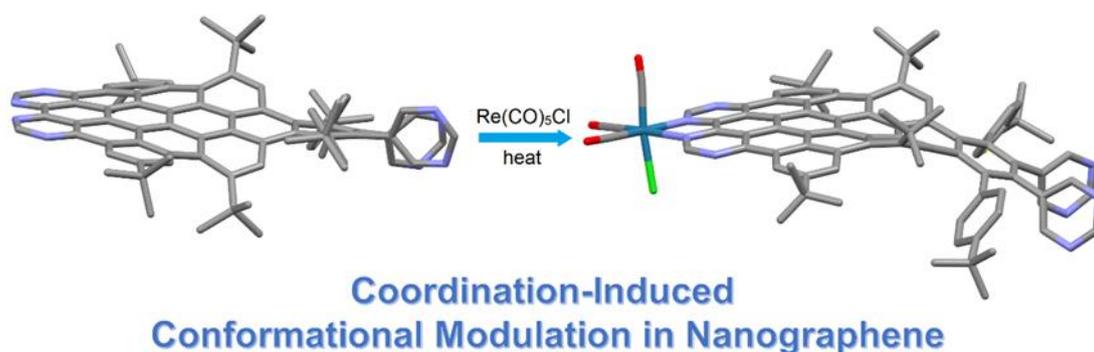
團隊成員： 陳嘉祥、Eldhose V. Varghese、陳信允、李建宏

團隊簡介： 本團隊致力於奈米石墨烯之合成及其應用

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The conformation of nanographene plays a pivotal role in determining its electronic, mechanical, and optical properties. Analyzing the conformation of nanographene is crucial because of its significant implications in various scientific and technological domains. In this work, we examined the changes in the structural conformation of nanographene upon coordination with a metal. We synthesized a series of nitrogen-doped nanographenes (**2**, **3**, and **4**) that differed by one C–C bond and their corresponding nanographene–Re complexes (**2Re**, **3Re**, and **4Re**). The conformations of the metal complexes were thoroughly analyzed using various spectroscopic techniques. A comparison of the X-ray crystal structures of nanographene before and after rhenium coordination revealed that rhenium coordination induced conformational changes in the nanographene moiety. Additionally, we assessed the catalytic activity of the nanographene–Re complexes toward the electrocatalytic hydrogen evolution reaction (HER). In the presence of a small amount of weak acid (1.5 mM acetic acid), the nanographene–Re complex exhibited hydrogen production at a low overpotential of 133 mV.





【Concrete Results】

In the presence of a small amount of weak acid (1.5 mM acetic acid), the nanographene–Re complex exhibited hydrogen production at a low overpotential of 133 mV.

【Research Team】

Team Member: Eldhose V. Varghese, Yi-Hung Liu, Hsing-Yin Chen, Chien-Hung Li and Chia-Hsiang Chen

Overview: Our team is dedicated to the synthesis of nanographene and its applications.

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