

論文名稱：含氮配基之銻金屬超分子自組裝與性質研究

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摘要

本論文探討可彎曲性含氮配基 1,2-bis(4-pyridyl)ethane (bpe)和 1,3-bis-(4-pyridyl)propane (bpe)與銻金屬溶劑熱合成法，進行自組裝反應，並研究矩形及環狀三角形超分子等產物之結構與性質。

利用有機配子 1,2-bis(4-pyridyl)ethane (bpe)和 1,3-bis-(4-pyridyl)propane (bpp)與 $\text{Re}_2(\text{CO})_{10}$ 在醇類中反應，分別得矩形超分子 $[\text{Re}_4(\text{CO})_{12}(\text{bpe})_2(\text{OC}_4\text{H}_9)_4]$ (1)及三角形超分子 $[\text{Re}_2(\text{CO})_6(\text{bpp})(\text{OCH}_3)_2]$ (4)，並另外得到一個非預期的超分子 $[\text{Re}_2(\text{CO})_6(\text{bpp})(\text{ox})]$ (5)。bpe 和 bpp 與 $\text{Re}_2(\text{CO})_{10}$ 在 2,2'-bisbenzimidazole (BiBzIm) 及 2,5-dihydroxy-1,4-benzoquinone (DHBQ)存在下反應，分別得到三角形超分子 $[\text{Re}_2(\text{CO})_6(\text{bpe})(\text{BiBzIm})]$ (2)、 $[\text{Re}_2(\text{CO})_6(\text{bpp})(\text{BiBzIm})] \cdot 0.25(\text{C}_8\text{H}_{10})$ (6)、 $[\text{Re}_2(\text{CO})_6(\text{bpp})(\text{DHBQ})]$ (7)。另外，bpe 與 $\text{Re}_2(\text{CO})_{10}$ 在 tetrahydroxy-*p*-benzoquinone 下反應，得到雙三角形超分子 $[\text{Re}_4(\text{CO})_{12}(\text{bpe})_2(\text{THBQ})] \cdot (\text{C}_6\text{H}_6)_2$ (3)。

本研究中詳細探討實驗合成方法、結構解析、並量測其性質。化合物2、4-7皆為文獻中少見的環狀三角形結構超分子，化合物3之結構型態則在文獻上尚未發現，為一個中間含有架橋基的雙三角形結構超分子。

關鍵詞：自組裝、三角形超分子、雙三角形超分子

Thesis: **Self-Assembly and Properties of Nitrogen-Containing Rhenium**

Supramolecules

School : Chinese Culture University

Department : Chemistry

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Degree : Master

Researcher : Li-Wei Lee

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Abstract

The goal of this thesis was to develop a self-assembly synthetic strategy for the preparation of rectangular metal-supramolecules and molecular triangles using 1,2-bis(4-pyridyl)ethane (bpe) and 1,3-bis(4-pyridyl)propane (bpp) as flexible ligands in a solvothermal method.

Treatment of the organic ligands, 1,2-bis(4-pyridyl)ethane (bpe) and 1,3-bis(4-pyridyl)propane (bpp), with $\text{Re}_2(\text{CO})_{10}$ in the presence of methanol and butanol under solvothermal conditions gave the rectangular compound, $[\text{Re}_4(\text{CO})_{12}(\text{bpe})_2(\text{OC}_4\text{H}_9)_4]$ (**1**) and triangular compound, $[\text{Re}_2(\text{CO})_6(\text{bpp})(\text{OCH}_3)_2]$ (**4**), and an unexpected species, $[\text{Re}_2(\text{CO})_6(\text{bpp})(\text{ox})]$ (**5**). Treatment of $\text{Re}_2(\text{CO})_{10}$, bpe, bpp and 2,2'-bisbenzimidazole (BiBzIm) or 2,5-dihydroxy-1,4-benzoquinone (DHBQ) afforded triangular complexes $[\text{Re}_2(\text{CO})_6(\text{bpe})(\text{BiBzIm})]$ (**2**), $[\text{Re}_2(\text{CO})_6(\text{bpp})(\text{BiBzIm})] \cdot 0.25 (\text{C}_8\text{H}_{10})$ (**6**), $[\text{Re}_2(\text{CO})_6(\text{bpp})(\text{DHBQ})]$ (**7**), respectively. In particular, treatment of $\text{Re}_2(\text{CO})_{10}$, bpe and tetrahydroxy-*p*-benzoquinone (THBQ) afforded a bitriangular compound $[\text{Re}_4(\text{CO})_{12}(\text{bpe})_2(\text{THBQ})] \cdot (\text{C}_6\text{H}_6)_2$ (**3**).

The products were characterized by spectroscopic methods and single-crystal X-ray diffraction analysis.

Key words: self-assembly, flexible ligand, molecular triangle, supramolecule