

ピリジン置換ジアザフェナレン誘導体の合成と物性評価

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A series of pyridyl-functionalized diazaphenalenenes for the construction of electroactive materials (¹ *Department of Chemistry, School of Science, Tokyo Institute of Technology*)

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Diazaphenalene (DAP) is a fused nitrogen-based heterocycle that exhibits interesting redox-active properties. Previously, we prepared a 4-pyridyl substituted analogue, 4-TPDAP (2,5,8-tris(4-pyridyl)diazaphenalene) and explored its electrochemical and spectroscopic properties.¹ 4-TPDAP has been used as a ligand to construct conductive coordination networks.^{2,3} In addition, this molecule was successfully deposited as thin films, which exhibited a robust resistive switching memory effect.⁴ More importantly, the electronic properties of these films were strongly dependent on the 4-TPDAP packing and crystallinity. These results indicate that substituted DAP derivatives could be used to make a variety of interesting electronic systems.

To further explore the chemistry of these systems, a series of pyridyl-functionalized DAP derivatives were prepared. The number of substituted pyridines and the relative position of the nitrogen atom in the pyridyl ring was varied. The resultant molecules have a wide range of structural and electronic properties and currently being incorporated into electroactive materials, such as coordination networks and organic thin films.

Keywords : Redox activity, Organic thin film

ジアザフェナレン (DAP) は、2 段階の酸化還元活性を示す含窒素複素環化合物である。当研究室では、導電性ネットワーク錯体の配位子として DAP に 3 つの 4-ピリジル基を導入した 4-TPDAP(2,5,8-tris(4-pyridyl)diazaphenalene)を合成し¹、その特性について研究を行ってきた^{2,3}。また、4-TPDAP の薄膜はヒステリシスを有する I-V 特性を示し、抵抗変化型メモリーデバイスへ応用できることが示唆されている⁴。

本研究では、4-TPDAP の異性体である窒素原子位置の異なる 3-TPDAP を新規に合成した。この分子は 4-TPDAP と同様に、メモリーデバイスや新たなネットワーク錯体への応用が期待できる。

また、Figure 1 に示すピリジン置換 DAP 誘導体も合成し、結晶構造や導電性など物性の評価・比較を行った。

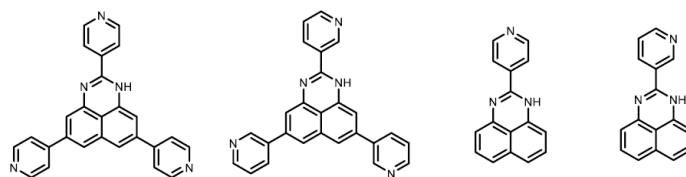


Figure 1 Chemical structures of select pyridyl substituted DAP derivatives

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