

**New pi-Electron Materials with
Extremely Superior Photophysical and Electronic Properties**

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【Outline of survey】

p-Conjugated molecules consisting of carbon-carbon unsaturated bonds (p-bonds) have characteristic photophysical and electronic properties due to the p-electron delocalization. These materials are the main players in the field of organic electronics, exemplified by organic electroluminescence devices, field-effect transistors, and photovoltaic cells. This research project aims at the creation of new p-electron materials with extremely superior properties, such as photophysical properties including intense solid-state luminescence, white emission, and low-threshold amplified spontaneous emission, as well as electronics properties including high carrier mobilities in amorphous or crystalline states and stable n-type semiconducting properties. On the basis of the molecular designs exploiting the features of main group elements, such as B, Si, P, S, the development of original new reactions, and higher-order structural control utilizing the nonbonded element-element intermolecular interaction, we will create key p-electron materials that can open a new aspect in this field.

【Expected results】

To attain the extremely superior photophysical and electronic properties above mentioned would improve the efficiency of the organic electronic devices and realize several important practical applications, such as flexible large-area display, white luminescence light, and organic laser. These achievements would provide a substantial impact on the improvements in our standard of living. In addition, this project would accumulate important knowledge in the solid-state chemistry of the p-electron materials and also shows a new direction in the field of main group chemistry.

【References】

- Ladder pi-Conjugated Materials with Main Group Elements, S. Yamaguchi, C. Xu, and T. Okamoto, *Pure Appl. Chem.*, **78**, 721-730 (2006).
- Boron as a Key Component for New pi Electron Materials, S. Yamaguchi and A. Wakamiya, *Pure Appl. Chem.*, **78**, 1413-1424 (2006).

【Term of project】 FY2007 - 2011

【Budget allocation】 24,000,000 yen
(2007 direct cost)

【Homepage address】

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