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Kohei Miyata

Highly Luminescent Lanthanide Complexes with Specific Coordination Structures

Doctoral Thesis accepted by
Hokkaido University, Sapporo, Japan

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Supervisor's Foreword

There has been significant recent interest in the development of luminescent metal complexes for applications such as optical materials, organic light-emitting diodes (OLEDs), and fluorescent sensors. These luminescence properties are strongly dominated by the type of organic ligand and the coordination structure, which together control the ligand field. In particular, the ligand fields of transition-metal complexes are affected by the particular geometrical structure, and a large number of studies have reported the link between the structure and the luminescence properties of luminescent metal complexes.

In this thesis, luminescent lanthanide complexes with specific coordination structures are introduced by Dr. Kohei Miyata. Specific coordination structures result in lanthanide complexes with remarkable photophysical properties. This thesis provides academic studies of specific coordination structures (mono-capped square-antiprism, dodecahedron, and coordination-polymer structures) of luminescent lanthanide complexes. Dr. Miyata has also successfully prepared thermostable and thermosensing luminophores composed of lanthanide ions and characteristic organic ligands. I believe that his studies contribute to successful exploration of new science and technology in our future.

Lanthanide complexes with characteristic photophysical properties, narrow emission bands, and long emission lifetimes, have been regarded as attractive luminescent materials for use in electroluminescent (EL) devices, lasers, and luminescent biosensing applications. Luminescent lanthanide complexes with specific coordination structures may lead to the development of new fields in photophysical, coordination, and materials chemistry.

Hokkaido, January 2014

Prof. Yasuchika Hasegawa

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