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Kenta Imoto

# Multifunctional Molecular Magnets Based on Octacyanidometalates

Doctoral Thesis accepted by  
The University of Tokyo, Tokyo, Japan

 Springer

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# Supervisor's Foreword

Multifunctional materials are intensively investigated in the field of chemistry, physics, and materials science due to the possibility of tuning a material's physical properties by external stimuli. The present thesis by Kenta Imoto deals with the demonstration of multifunctionalities in cyanido-bridged metal assemblies. One system presented in the thesis shows a conversion from the paramagnetic state to the ferromagnetically ordered state by light irradiation. This behavior is achieved by a rational chemical design and alignment of the photoactive spin-crossover sites with strong magnetic interactions. Other novel contributions assigned to this thesis are the demonstration of photo-induced magnetization in a two-step spin-crossover material and the realization of the coexistence between metamagnetism and super-ionic conductivity. These multifunctionalities are realized by the incorporation of a spin-crossover moiety or a hydrogen-bonding network to a magnetically coupled cyanido-bridged framework. In particular, in light-induced spin-crossover magnets, a magnetically non-ordered state can be altered to a magnetically ordered state by photo-irradiation, which is one of the attractive mechanisms for novel optical switching devices. The results in this work will be appealing to readers related to the field of materials science.

The studies in the thesis were performed between April 2011 and March 2014 at the Department of Chemistry, School of Science, The University of Tokyo, and have led to several publications and presentations at international conferences.

Tokyo, Japan  
December 2016

Prof. Shin-ichi Ohkoshi

**Parts of this thesis have been published in the following journal articles:**

- (1) S. Ohkoshi, K. Imoto, Y. Tsunobuchi, S. Takano, H. Tokoro, *Nature Chemistry* 3, 564 (2011).
- (2) K. Imoto, K. Nakagawa, H. Miyahara, S. Ohkoshi, *Cryst. Growth Des.*, 13, 4673 (2013).
- (3) K. Imoto and S. Ohkoshi, *Chem. Lett.*, 45, 359 (2016).

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