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PII: S1359-0294(17)30121-8
DOI: https://doi.org/10.1016/j.cocis.2017.12.007
Reference: COCIS 1160

To appear in:

Received date: 30 October 2017
Revised date: 12 December 2017
Accepted date: 13 December 2017

Please cite this article as: Hong Li, Haonan Peng , Recent advances in self-assembly of spin crossover materials and their applications. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Cocis(2017), https://doi.org/10.1016/j.cocis.2017.12.007

Recent advances in self-assembly of spin crossover materials and their applications

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ABSTRACT

Spin crossover (SCO) complexes can be switched between low spin and high spin states induced by an external perturbation, which can be distinguished with different magnetic, optical, and structural characteristics. These properties make spin crossover materials promising candidates for applications in spintronics, information storage, sensors, digital display, and so on. In this review, we present a concise overview of research progress in last three years on self-assembly of spin crossover materials and their applications. The review starts with a detailed description of various methods developed for preparation of spin crossover particles and spin crossover films. Then highlights on their typical applications in the fields of sensing, information storage, and actuators. The review concludes with an outline of current limitations and future potential of spin crossover materials.

Keywords: Spin crossover, Self-assembly, Nanomaterial, Films, Sensing

1. Introduction

The spin crossover (SCO) phenomenon, also called spin transition (ST) phenomenon, that switches the system between low spin (LS) and high spin (HS) states, has attracted much attention due to its potential applications in spintronics, information storage, sensors, and digital display, and so on. The two states of SCO complexes can be distinguished with different magnetic, optical, and structural characteristics, which can be induced by an external perturbation such as temperature, light, pressure, magnetic field or inclusion of a guest molecule. When the structural changes associated with the spin transition are transmitted in a cooperative manner across the molecular network, the transition will occur with steepness and possibly accompanied by a hysteresis loop (the first order transition). In particular, some SCO