

- Title : Spin-crossover molecular complexes for visible-light modulators
- Author(s) information

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- 250-word abstract for technical review

Phase Change Materials (PCMs) are materials that, in response to the application of an external (thermal, optical, electrical) excitation, show large changes in their complex refractive index as a consequence of the induced reversible switching between their various electronic or structural configurations. To-date, the most prevalently studied PCMs are liquid crystals (e.g. 5CB) displaying order–disorder type transitions, chalcogenides (e.g. GeSbSeTe) showing amorphous-crystalline phase change and transition metal oxides (e.g. VO_x) exhibiting metal–insulator transitions. In this context, emerging molecular spin-crossover (SCO) complexes that display reversible switching between their low-spin and high-spin electronic configurations represent a promising novel class of PCMs with high potential for active photonics applications.

In this contribution, we will present our recent studies on evaporable spin-crossover molecular compounds such as the [Fe(HB(1,2,4-triazol-1-yl)₃)₂]. In addition to describing the obtained material properties, we will summarize the means we have developed to pattern such compounds on the micrometre-scale and give examples of the use of these PCMs in photonic devices. In particular, we will show the design, the fabrication and the experimental characterisation of metal-mirror Fabry-Perot interferometers that allow the conversion of the 0.07 refractive index change into a resonant optical intensity modulation of 26% in the visible wavelength range. We will also report the latest progress towards the demonstration of broadband modulators based on these materials using a thin SCO layer embedded in a frustrated total internal reflection system.

- 100-word summary for the program

Phase Change Materials are materials that exhibit a large optical change in their complex index of refraction upon switching between their various electronic or structural states. As such, they offer a promising way to implement tunability and reconfigurability in the next generation of nano-photonic devices.

In this contribution, we will review our recent studies on spin-crossover molecular compounds that can be evaporated and micro-structured. We will also report their use to make resonant and broadband thermo-optic modulators operating in the visible wavelength range respectively based on

metal-mirror Fabry-Perot interferometers and frustrated total internal reflection systems.

- Keywords used in search for your paper (optional)