"Prof. Yann Garcia's research team – IMCN MOST A unique expertise in the development of bistable functional materials"

Garcia, Yann
Pr. Yann Garcia is active within three COST networks (hybrid materials, molecular spintronics, spin state technology), member of the International Board for the Applications of the Mössbauer Effect (IBAME) and president of the French-speaking group of Mössbauer spectroscopy (GFSM) since 2007. Pr. Garcia is involved in the edition of scientific journals of reference. Yann Garcia also pursues leading-edge research studies which are very well recognized in molecular magnetism and Mössbauer spectroscopy circles.

Pr. Garcia’s research team investigates smart materials which may change their color and magnetism when exposed to an outside stimulus such as temperature, pressure, luminosity, gas emissions, etc. These are the so-called optical bistable materials, meaning materials that display two different colors at the same temperature. The research team focuses on synthesis, characterization, and formatting of spin-transition molecular materials.

Thanks to its unique expertise in Belgium, Pr. Garcia’s research team has developed an indicator defining the maximum temperature threshold for combustible material; a freshness sticker for the cold chain in mass retail and, just recently, a safety labeling system for heat-sensitive vaccines. Pr. Yann Garcia’s research team also developed a material that functions like a metallic mercury sponge, to prevent, for instance, children’s possibly ingesting the mercury beads that are present in some thermometers.

Aware of the innumerable applications made possible by the characterization of these new materials and their optimization, Pr. Yann Garcia’s research team currently cooperates with ONERA in the field of shock detectors in aviation: airplanes may receive a surface coating including these materials and, in case of impact, this would change the color of the surface, making it possible for the airline companies to know immediately if the said impact lies on a sensitive part of the airplane. At the same time, Pr. Garcia’s team is working on a new range of alcohol and acid detectors; for instance, identified by a color change. The same research team is also developing photochromic and magnetic materials operating at ambient temperatures – a promising approach to multifunctional materials. Finally, Pr. Garcia’s research team relies on its Mössbauer park to offer services of scientific characterization on iron-based materials; a more sophisticated technique but complementary to X-ray powder diffraction analysis, for instance currently employed by NASA to study minerals on the planet Mars.

At present, Pr. Yann Garcia’s laboratory personnel must answer the need of upgrading its stock of instruments to meet its operating needs, which may induce them to search for sponsors or industrial partnerships. On the scientific front, Pr. Garcia’s research team remains determined to pursue the development of bistable functional materials for use in everyday life: a challenge at their fingertips!