Thiophene based molecular materials for (non)linear optics

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Abstract

New generations of the optoelectronic devices for communications, optical switching and information storage require the development of materials with exceptional nonlinear optical (NLO) response. Thus, organic materials, polymeric materials, organometallic or coordination metallic complexes as well as new hybrid organic/inorganic nanocomposites have been the subject of both experimental and theoretical investigations during many years because of their valuable potential applications in photonics and optical devices We have been recently interested in the synthesis and characterization of both electroactive and photoactive organic materials as well as their coordination metal complexes for nonlinear optical applications. These NLO properties could be modulated by the nature of the donor/acceptor and in the case of metal complexes by the nature of the metal cation used.

In this presentation a focus will be made on first the chemical synthesis and characterization of the organic push-pull materials and the ligands and their corresponding metal complexes using d-transition metal cations such as Zn(II) (see the figure below) , Ru(II), Fe(II),… Then we will discuss about the valuable potential of such materials to be used in photonics by studying their nonlinear optical properties. A particular interest will be on the effect of the nature of substituents within the organic materials and then on the effect of the nature of the metal used in the metal complexes.

Recent Publications (maximum 5)

1. El Karout *et al*. *J. Mater. Chem C.* 12 (2024) 11458.
2. Szukalski *et al.*, *Adv. Optical Mater. (*2024) 2402946.
3. Taboukhat *et al*., *J. Phys Chem.C,* 128 (2024) 19839.
4. Cheret *et al*., *Polyhedron*, 233 (2023) 116299.
5. Waszkowska *et al.*, *Dyes & Pigm*., 186 (2021) 109036.

Biography

Abdelkrim El-Ghayoury received his Ph.D. in 1999 in Molecular chemistry at Strasbourg University. After two years post-doc (1999-2001) in Eindhoven University of Technology, he worked as senior researcher in TNO Institute of Technology (2001-2004). Since 2004, he is an associate professor in Angers University where he received his habilitation in July 2013. He is working on multifunctional molecular materials for photonics and optoelectronics. He is interested in associating organic donors and acceptors (push-pulls) as well as coordination metal complexes for optoelectronics. He is interested in associating two or more physical properties within the same material through coordination chemistry. He is also interested in linear and nonlinear optical properties of functionalized (metallo)supramolecular architectures. He has published more than 100 articles (h-index = 32; 3079 citations, 26.8 citations per article: source web of science, February 07th 2025); and he is a co-author of one international patent. He presented over than 30 regular as well as invited conferences (in national and international conferences) and invited seminars and he was part of the organizing committee of six national and international conferences. He has supervised over than10 master students, co-supervised 3 PhD students and is actually supervising 1 PhD Students.

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