# Charge transport properties of bistable molecular complexes and their integration into nanoelectronic and spintronic devices

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## Abstract

Transition metal complexes that exhibit spin crossover (SCO) behavior, switching between low spin (LS) and high spin (HS) states [1], are highly promising for the advancement of electronic and spintronic devices [2]. A key advantage of developing electronic devices based on switchable molecules lies in the strong connection between fundamental research and technological innovation. Insights into the charge transport properties of SCO complexes can often be swiftly applied to new device architectures, driving rapid improvements in device performance and functionality.

In this lecture, I will present a comprehensive analysis of charge transport properties in SCO complexes, considering various forms such as powders [3], thin films [4-6], and polymer composites. I will also discuss how these materials respond to different stimuli (temperature, light, pressure) and their applications in nanoelectronic and spintronic devices.

### References

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[2] C. Lefter et al., *Magnetochem.*, **2** (2016) 18.
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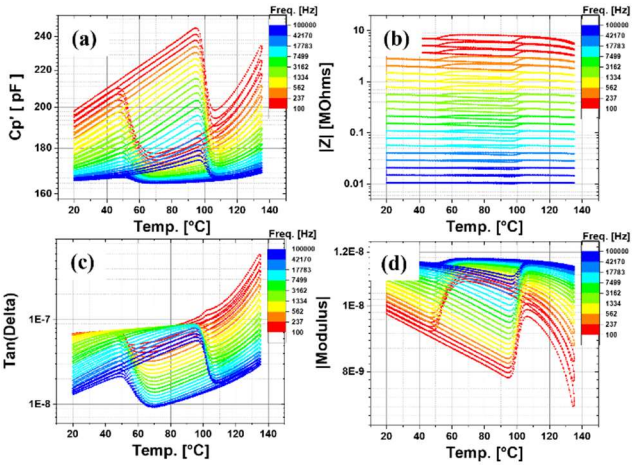


**Fig. 1** Temperature dependence of the: (a) Electrical capacitance; (b) Impedance; (c) Loss tangent and (d) Electrical modulus recorded on SCO-polymer composites thin film.

### Recent Publications

1. L. Getzner et al., *Nature Commun.*, **15** (2024) 7192
2. L. Padurariu et al., *ACS Appl. Mater. & Interf.*, **15** (2023), 5744-5759
3. L. Sun, A. Rotaru, Y. Garcia, *J. Haz. Mater.*, **437** (2022) 129364.
4. I. Rusu, et al., *J. Appl. Phys.*, **129** (2021) 064501.
5. G.-M. Rotaru, et al., *Symmetry*, **13** (2021) 1148.
6. Z. Yuteng, et al., *J.Phys.Chem-Condens.Matter*, **2020**, 32, 214010
7. I. Soroceanu et al., *J. Phys. Chem. Lett.*, **2019**, 10, 7391-7396.

### Biography

Assoc. prof. Aurelian ROTARU received his M.Sc. in Electrical and Magnetic Properties of Fine and Ultra-Fine Particles in 2006 from the Faculty of Physics "Alexandru Ioan Cuza" University (UAIC), Iasi, Romania and his Ph.D. in Molecular Magnetism in 2009 from University of Versailles Saint Quentin en Yvelines (UVSQ), France and UAIC under the joint supervision of Prof. J. Linares (UVSQ) and Prof. A. Stancu (UAIC). He spent 1 year at AMRI, New Orleans, Louisiana in the *Spin Dynamics group* of Prof. Leonard SPINU as a postdoctoral researcher. He moved to Suceava, Romania, in 2010 as a Lecturer at the Faculty of Electrical Engineering and Computer Science (FIESC), Stefan cel Mare University (USV). In 2011 he was promoted to Associate Professor in the same department. Since 2011, **he is leader** of the *Advanced Multifunctional Materials group* (http://nanomat.usv.ro/) at USV, Suceava. His present research is mainly focused on molecular spin crossover materials and their integration into nanoelectronic, spintronic and optoelectronic devices. Dr. Aurelian ROTARU's research activity is reflected by the 124 published ISI papers, 1 book chapter, h-index: 35 and 11 projects in his research field. He served as Vice Dean of the Faculty of Electrical Engineering and Computer Science, USV from 2020 to 2024. Currently, he is the Vice Rector for Scientific Activities at Ștefan cel Mare University of Suceava.

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