Preface

For several years, the two parallel worlds of Molecular Conductors in one hand and Molecular Magnetism in the other have grown side by side, the former essentially based on radical organic molecules, the latter essentially based on the high spin properties of metal complexes. Over the last few years however, *organometallic* derivatives have started to play an increasingly important role in both worlds, and have in many ways contributed to open several passages between these two worlds. This volume recognizes this important emerging evolution of both research areas. It is not intended to give a comprehensive view of all possible organometallic materials, and polymers for example were not considered here. Rather we present a selection of the most recent research topics where organometallic derivatives were shown to play a crucial role in the setting of conducting and/or magnetic properties in crystalline materials. First, the role of organometallic anions in tetrathiafulvalenium-based molecular conductors is highlighted by Schlueter, while Kubo and Kato describe very recent *ortho*-metalated chelating ligands appended to the TTF core and their conducting salts. The combination of conducting and magnetic properties and the search for π–d interactions are analyzed in two complementary contributions by Myazaki and Ouahab, while Valade focuses on the only class of metal bis(dithiolene) complexes to give rise to superconductive molecular materials, in association with organic as well as organometallic cations. The structures and properties of the salts based on such metallocenium cations and transition metal bis-dichalcogenide anions are then comprehensively reviewed by Almeida and Gama. This is followed by a review by Fourmigué on paramagnetic organometallic cyclopentadienyl/dichalcogenide complexes.

Perhaps the common characteristic of all contributions to this volume is the permanent concern about the intimate relationships between the structural and electronic properties. Indeed, the careful design of increasingly complex molecular and supramolecular architectures allows us now to anticipate many molecular and solid state properties, but the final solid state structures are always the results of many competing interactions. The resulting electronic properties of these radical assemblies, whether conductivity or magnetism, are always very sensitive to minute modifications of their solid state structures and one of the main difficulties through

the investigation of such materials is always the identification of the nature and relative strength of all possible electronic interactions paths. In that respect, organometallic derivatives, for example with strongly delocalized spin densities, bring added elements of complexity, as the reader will discover in the next seven contributions.

Rennes, France,
December 2008

Marc Fourmigué
Lahcène Ouahab

http://www.springer.com/978-3-642-00407-0

Conducting and Magnetic Organometallic Molecular Materials

(Eds.)M. Fourmigué; L. Ouahab
2009, XII, 193 p. 104 illus., 22 in color., Hardcover
ISBN: 978-3-642-00407-0