In recent decades a large interest of the scientific community worldwide has focused on the molecular inorganic compounds – i.e. a metal embedded in an organic molecule – due to the broad panel of applications in everyday life such as in therapy targeted uses: E.g. when the metal is iron, eliminating its excess from the organism after a surgery involving intensive blood transfusion requires the use of a called siderophore –sideros (greek)= carry iron – specific molecule which traps free iron ions, allowing the elimination of the so formed complex in urine.

Also iron ion can be in two electronic states, low spin (LS) or high spin (HS) with different volumes and colors in Spin CrossOver SCO complexes which have applications in food supply chain traceability, in display devices, etc.... Going from LS to HS and vice versa involves specific mechanisms of Molecular Magnetism investigated within interdisciplinary experimental research (physics, chemistry, ultrafast $10^{-15}$s laser excitation spectroscopy....) backed by theoretical/modeling identifications of relevant properties.

One of our most recent works discussing the Impact of Spin State Transition on Vibrations of large Fe$^{2+}$ complexes (figure, video) was published in a “Cluster Issue” of the renowned European Journal of Inorganic Chemistry (Wiley) where theoretical works from Lebanese German University were done in support of results of research at the University of Bordeaux and CNRS-France.

Dr Samir Matar (LGU)

[Fe(PM-BiA)₂(NCS)₂] SCO complex (PM-BiA stands for N-(2-pyridylmethylene)aminobiphenyl)

Electrons are excited from the Fe(NCS)₂-lower half- to the Fe(PM-BiA)₂ ligands-upper half-.