A paramagnetic to antiferromagnetic electron spin coupling transition induced by an electric field in a Polyoxometalate.

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Polyoxometalates (**POM**) are a class of inorganic compounds that present a remarkable degree of molecular and electronic tunabilities that impact in many disciplines (catalysis, medicine, materials science). Due to their cluster-type structure, POM are specially useful as model systems for the studies of electronic and magnetic interactions. Indeed, many of these structures allow the inclusion of paramagnetic ions with various nuclearities and definite topologies and geometries. Moreover, they permit a controlled injection of electrons, giving rise to mixed-valence species in which delocalized electrons may coexist and interact with localized magnetic moments.

The possibility to handle the spin information of electrons is of the highest importance for molecular spintronic applications. This work presents a theoretical model Hamiltonian study of the influence of an external electric field on the coupling between two electrons delocalized over the $[GeV_{14}O_{40}]^{8-}$ POM. We show how the coupling, that is almost zero for a small electric field, affords a sudden rise.

References

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Figures