Chemical Control of Spin in the Synthesis of Metal-Organic Magnets and Responsive MRI Probes

Part 1: Metal-organic magnets offer several advantages over their inorganic analogues, most notably chemical programmability and control. Potential applications, such as lightweight permanent magnets and spin-based information processing, would all benefit from a higher operational temperature, which is correlated to the strength of magnetic interactions. We are working to synthesize metal semiquinoid molecules and networks that feature strong magnetic coupling between metals and radical linkers. This presentation will describe the synthesis and properties of new radical-bridged compounds comprising dinuclear molecular complexes and 2D networks.

Part 2: Variation of properties such as redox status, temperature, and pH of the extracellular environment is closely associated with a number of biological processes and diseases. We are working to design paramagnetic MRI probes that undergo changes in magnetic behavior in response to changes in these properties, where these changes can then be translated to MR spectra or images. This presentation will describe the employment of spin-crossover Fe (II) complexes as MR thermometers and dinuclear complexes for the ratiometric quantitation of solution redox status and pH.

Host: Dave Schultz