Physical properties of cation-doped binary and ternary iron oxides: experimental and computational Modeling

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Binary and ternary iron oxides, of the ferrites family, are model materials that illustrate how the physical properties are dependent on the crystalline structure. In this talk our recent experimental and computational research on the structure and physical properties of ferrites will be highlighted. In particular, I will show how we combine a host of experimental techniques with theoretical atomistic and DFT modeling to investigate how modifying the crystal structure of "spinel" magnetite (Fe_3O_4), "garnet" YIG ($Y_3Fe_5O_{12}$) and the rare earth "orthoferrite" ($EuFeO_3$) via cation-doping, reducing their particle size to the nanometer scale or both could lead to interesting magnetic properties, among others.