Poster-2-3

Disorder and Magnetism in Rare Earth Silicate Compounds

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Rare earth silicates are an interesting class of materials owing to their potential for applications. The magnetic properties of these materials have not been investigated in detail until recently due to the complexity of the phase diagrams. Rare earth silicates systems form in a large number of chemical, e.g. R_2SiO_5, $R_2Si_2O_7$ and $R_{4.67}(SiO_4)_3O$, and structural phases. At ambient pressure, depending on the nature of the rare earth ion and temperature, R_2SiO_5 crystallizes in 2 crystal-types, whereas $R_2Si_2O_7$ has 7 polymorphs. The arrangement of the magnetic rare earth ions varies greatly for each chemical phase and structural type, leading thus to a wide array of possible magnetic properties across the entire rare earth series of silicates. New studies show that C-type $Yb_2Si_2O_7$ is a strongly spin-orbit coupled quantum dimer magnet [1], whereas C and D-polytypes of $Er_2Si_2O_7$ are Ising-like antiferromagnets below $T_N = 2.3$ and 1.9 K, respectively [2-5]. Here, I will discuss the challenges associated with the synthesis of crystals of the R_2SiO_5, $R_2Si_2O_7$ and $R_{4.67}(SiO_4)_3O$ chemical composition [4,6], and I will present our recent results on the structural and magnetic properties of these materials [4,5, unpublished results].

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