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Strong Antiferromagnetic Super Exchange in AgF2

Authors : Wojciech Grochala

Abstract : AgF2 is an important two-dimensional antiferromagnet and an analogue of [CuO2]2– sheet. However, the strength of magnetic superexchange as well as magnetic dimensionality have not been explored before . Here we report our recent Raman and neutron scattering experiments which led to better understanding of the magnetic properties of the title compound. It turns out that intra-sheet magnetic superexchange constant reaches 70 meV, thus some 2/3 of the value measured for parent compounds of oxocuprate superconductors which is over 100 meV. The ratio of intra-to-inter-sheet superexchange constants is of the order of 102 rendering AgF2 a quasi-2D material, similar to the said oxocuprates. The quantum mechanical calculations reproduce the abovementioned values quite well and they point out to substantial covalence of the Ag–F bonding. After 3 decades of intense research on layered oxocuprates, AgF2 now stands as a second-to-none analogue of these fascinating systems. It remains to be seen whether this 012 parent compound may be doped in order to achieve superconductivity.

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