New *Swedenborgites* - a playground for physics and chemistry

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A new group of metal oxides, structurally based on the natural mineral *Swedenborgite* ($SbNaBe_4O_7$) [1], has recently got more attention in the scientific community. The reason for this is the manifold of magnetic, electric, and other applicable properties that this system exhibits. The atomic structure contains a sublattice with high geometrical frustration, ending in exotic magnetic states, if this lattice is occupied by antiferromagnetically coupled spins. Furthermore, the crystal structure is non-centrosymmetric and polar, inducing electric properties.
Even in the first report on $YBaCo_4O_7$ [2] it was obvious that further studies on this and related compounds would reveal diversities, as many questions were left open.
Chemically, the *Swedenborgite* exhibits large substitutional flexibility [3] as well as a broad oxygen stoichiometry range; the latter has already inspired to use the materials as oxygen storage [4], membranes, and cathodes [5].
Although the structural motifs are the same, the crystal symmetry is also under debate, as cubic to monoclinic space groups have been used to describe the different compositions.
The spin structure is sensitive to the chemical composition and exhibits either the presence or the absence of long range order at lower temperatures. In the cases where only short range order occurs, despite extremely strong spin to spin couplings, a theoretically predicted ground state evolves [6].
Concerning the electric polarity, recent pyrocurrent measurements reveal that the *Swedenborgites* most probably can be described as pyroelectrics.

References

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