Crystal structure of a non-centrosymmetric system, $CuY_2Ge_2O_8$

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A non-centrosymmeric material doesn't have aninversion symmetry, which could lead to the intrinsic electric polarization. Whenthis system consists of magnetic ions, the electric polarization of the systemcan be modified by a so-called magnetoelectric coupling under magnetic field. Thismultiferroic property has been widely studied not only for physical interestbut also for industrial application.

We synthesized both single crystal and polycrystallinesamples of new multiferroic systems, Cu(Y,La) Ge and determined the crystal structure at 300 and 450 K using high-resolution powderand single crystal diffraction studies. According to our studies, both sampleshaving magnetic Cu^{2+} ions has a monoclinic unit cell (space group I 1 1) without inversion symmetry. We also determined the high temperature structurethat has a more symmetric orthorhombic unit cell (I m m 2). Using the structural information, we could calculate the theoreticalelectric polarization at room temperature phase and found that it reaches theelectric polarization of 9.88 $\mu C/cm^2$ along the a-axis.