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The structural, magnetic, and electric properties of Sr and Ca-doped $BiFeO_3$ films.

CHAN-HO YANG, M. HUIJBEN, Y.-H. CHU, L.W. MARTIN, M. HOLCOMB, R. RAMESH, Department of Material Science Engineering and Department of Physics, University of California, Berkeley, M. CHI, N. BROWNING, Department of Materials Science and Engineering, University of California, Davis — Many perovskite oxides, as holes are doped, exhibit unusual physical phenomena such as superconductivity, colossal magnetoresisitance, metal-insulator transition, and charge ordering. We are expoloring the consequences of hole doping into a well known multiferroic, the antiferromagnetic ferroelectric, $BiFeO_3$. In this presentation, the systematic investigation on structural, electric, and magnetic properties will be presented for nominally hole-doped $BiFeO_3$ obtained by partially substituting the Bi ions by divalent ions (such as Ca and Sr). The parent $BiFeO_3$ is unique single-compound multiferroic material with ferroelectricity and magnetic ordering at room temperature, has polarization along [111] direction and is a G-type antiferromagnet. The divalent ion doping weakens the ferroelectric properties but improves magnetization owing to cluster-glass-like magnetism. We will discuss the magnetic properties based on superexchange mechanism. The structural characterization by X-ray diffraction, scanning microscopy and TEM will be presented. The SQUID and the dielectric constant measurements as a function of magnetic field and temperature will be also reported.

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