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Anisotropy, Magnetism and Bulk Spin Valve Effect in Fe-doped Bilayer Ruthenate $Ca_3Ru_2O_7$[1] T.F. QI, J. TERZIC, G. CAO, Center for Advanced Materials, Department of Physics and Astronomy, University of Kentucky — The bilayered Ruthenate $Ca_3Ru_2O_7$ displays a wide variety of physical properties derived from the competitions among the orbital degrees of freedom of the Ru-ions, spin-orbit interactions and lattice distortions. We report our recent results of structural and physical properties of single-crystal $Ca_3(Ru_{1-x}Fe_x)_2O_7$ ($0 < x < 0.2$) as a function of temperature and magnetic field. The central finding of this study is that (1) $Ca_3(Ru_{1-x}Fe_x)_2O_7$ display highly anisotropic and antiferromagnetic state that is clearly manifested in the magnetization, electrical resistivity and specific heat; (2) Bulk spin valve effect (SVE) is observed in bulk single crystals of $Ca_3(Ru_{1-x}Fe_x)_2O_7$. This study along with our previous work on SVE suggests that the bulk SVE may be commonplace in 3d-element doped $Ca_3Ru_2O_7$. The results will be presented and discussed along with comparison drawn with other 3d-element doped $Ca_3Ru_2O_7$ single crystals.

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