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Gap physics of the doped semiconductor (Ca,F):LaMnPO[1] J.W. SIMONSON, M.C. ARONSON, Physics and Astronomy Dept., Stony Brook University — Single crystals of $Ca_xLa_{1-x}MnPO$ and $LaMnPO_{1-y}F_y$ (x = 0 to 0.50, y = 0 to 0.40) were synthesized to study the effect of Ca and F doping on LaMnPO, which is isostructural with several recently discovered Fe-based superconductors. The inclusion of F into the lattice was confirmed with single crystal XRD, showing a systematic reduction in unit cell volume with dopant content, in agreement with published accounts of similar compounds. Little change from undoped LaMnPO was observed in the resistivity of Ca doped crystals, while doping with successively higher concentrations of F yielded a systematic enhancement of conductivity. Nonetheless, all resistivity measurements were semiconducting, suggesting that E_F remains pinned within the gap regardless of dopant concentration. Activated behavior was observed, with activation energies falling below 100 meV, substantially less than the 1 eV optical gap. At low temperatures, the resistivity of all compositions exhibited temperature dependence in accord with variable range hopping, suggesting that transport is dominated by disordered and localized states at the Fermi level.

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