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Magnetoresistance Caused by Spin-polarized Variable Range Hopping–Perovskite Ruthenates I-W. CHEN, F. HUANG, Department of Materials Science and Engineering, University of Pennsylvania, Philadelphia, PA19104-6272, USA — We report a detailed study of A-site and B-site substitution on magnetoreistance of perovskite ruthenates, which have broad implications. By progressively disrupting the conducting pathway in the ferromagnetic $SrRuO_3$, we found it first undergoes Anderson localization, then exhibits very large negative magnetoresistance (exceeding -60% compared to the zero-field resistance). The implication is that any ferromagnetic metal should acquire a large magnetoresistance when it is rendered insulating by way of disorder, regardless of whether the disorder is caused by a magnetic or nonmagnetic impurity. This pathway is especially feasible in strongly correlated metals such as $SrRuO_3$. A model based on variable range hopping of spin-polarized electrons can quantitatively explain the data.

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