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Unusual Physical Properties of $Ca_3Co_4O_9$[1] RONGYING JIN, LARRY ALLARD, DOUG BLOM, Materials Science and Technology Division, Oak Ridge National Laboratory, SRIPARNA BHATTACHARYA, VEERLE KEPPENS, Department of Materials Science and Engineering, The University of Tennessee, BRIAN SALES, DAVID MANDRUS, Materials Science and Technology Division, Oak Ridge National Laboratory — We have investigated the structural and physical properties of $Ca_3Co_4O_9$ single crystals including electrical and thermal conductivity, thermopower, specific heat, magnetic susceptibility, and electron diffraction. The study reveals many interesting features that are unique to $Ca_3Co_4O_9$. In addition to high thermopower and low thermal conductivity, the low-temperature specific heat yields large electronic specific heat coefficient, suggesting strong electron-electron correlation. However, the electronic specific heat coefficient is dramatically decreased under magnetic field, implying the modification of electronic density of states by magnetic field. The magnetic susceptibility data indicate that there are several magnetic transitions above room temperature. The possible correlation between charge, spin, and lattice will be explored.

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Rongying Jin
Oak Ridge National Laboratory

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