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Combined effects of annealing/quenching and transition metal substitution on physical properties of CaFe_2As_2 ¹ SHENG RAN, SERGEY BUD'KO, PAUL CANFIELD, Ames Laboratory U.S. DOE and Department of Physics and Astronomy, Iowa State University — Our previous work on CaFe_2As_2 single crystals grown out of FeAs flux has shown that a process of annealing and quenching can be used as an additional control parameter which can tune the ground state of CaFe_2As_2 systematically, in a manner similar to applied pressure. With combined effect of annealing/quenching and transition metal substitution, CaFe_2As_2 system offers ready access to the salient low-temperature states associated with Fe-based superconductors: antiferromagnetic/orthorhombic, superconducting, and nonmagnetic/collapsed tetragonal. In this talk we will present systematic studies of the combined effects of annealing/quenching and chemical substitution with various transition metals (Co, Ni, Rh) on the physical properties of CaFe_2As_2 and construct phase diagrams for different substitution levels and different annealing/quenching temperatures.

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Sheng Ran
Ames Laboratory U.S. DOE and Department of Physics
and Astronomy, Iowa State University

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