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Chemical control of the superconductivity in NaFeAs and LiFeAs derivatives SIMON CLARKE, DINAH PARKER, MICHAEL PITCHER, STEPHEN BLUNDELL, TOM LANCASTER, ISABEL FRANKE, JACK WRIGHT, University of Oxford, PETER BAKER, FRANCIS PRATT, Science and Technology Facilities Council, UK — The correlation of composition with structure and physical properties will be described for the "111" series of alkali metal iron pnictides AFeAs (A = Li, Na). A combination of high resolution X-ray and neutron powder diffraction, muon-spin rotation spectroscopy and magnetometry measurements will be described which probe the competition between superconductivity and antiferromagnetism in stoichiometric NaFeAs and the cobalt- and nickel-doped derivatives. The behavior of these systems in which a superconducting dome is traversed as 0.1 electrons per Fe atom are added to the stoichiometric NaFeAs system will be discussed in relation to other classes of iron pnictide superconductors. The behavior of the doped NaFeAs system will be contrasted with the behavior of the doped LiFeAs system, for which the stoichiometric composition shows the optimal superconducting properties. The extremely high sensitivity of the LiFeAs system to composition and Li/Fe disorder will also be described. The differences in behavior of the NaFeAs and LiFeAs systems and the differing responses of the electronic properties of the two systems to applied hydrostatic pressure will be related to the structural parameters.

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