

Synthesis and superconductivity in RV_2Al_{20} and $CaBi_2$

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Abstract

Series of compounds with the stoichiometry RV_2Al_{20} (R=rare earth) were synthesized by arc melting method in a high purity Ar atmosphere. The lattice constant, determined from Rietveld refinement, increases with increasing radii of the rare earth metal, which is located inside a CN16 Frank-Kaspar polyhedra formed by 16 Al atoms. The smallest $a = 1.44978$ nm is observed for ScV_2Al_{20} , whereas the largest lattice parameter $a = 1.4617$ nm is observed for LaV_2Al_{20} . We used magnetic susceptibility, resistivity, and heat capacity measurements to characterize the superconducting state in MV_2Al_{20} , where M = Sc, Y and Lu. Superconducting critical temperature is 1.0 K,