

SYNTHESIS OF COMPLEX CERIUM-RICH INTERMETALLICS IN CE/CO FLUX.

Patricia C. Reynolds, Susan E. Lattuner. Department of Chemistry and Biochemistry, Florida State University, 95 Chieftan Way, Tallahassee, FL 32306.

New phases $Ce_{16}Fe_5Al_7C_{18}$ and $Ce_{66}Fe_{28}B_{15}(C_2B)_{34}$ were synthesized using Ce-Co flux. $Ce_{16}Fe_5Al_7C_{18}$ is grown in steel crucibles, and crystallizes with a new structure type in the tetragonal space group $P4/mmm$ with unit cell parameters $a=15.630\text{\AA}$, $c=11.420\text{\AA}$. The structure features a zeolite-like framework composed of corner sharing planar FeC_3 units, with clusters of Al atoms coordinated by 9 Ce atoms filling the "channels" of the framework. $Ce_{66}Fe_{28}B_{15}(C_2B)_{34}$ is grown in alumina crucibles, and crystallizes in a new structure type in the cubic space group $Im-3m$, with unit cell parameter $a=14.6173\text{\AA}$. It contains an $Fe_{14}B$ cluster located in the center and corners of the unit cell. Protruding from this cluster is a 4 atom chain of C and B atoms. Careful bond length analyses indicate that carbon and boron are alternating in the chain. Both phases were studied using magnetic susceptibility measurements and Mossbauer spectroscopy to characterize the observed ordering transitions.