

## **CRYSTALLOGRAPHY AND CRYSTAL CHEMISTRY OF $\text{Ba}(\text{R}, \text{R}')_2\text{CuO}_5$ (R and R'=LANTHANIDES)**

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Continued global research in high  $T_c$  superconductors has led to the promise of a wide variety of industrial applications, including power distribution, energy storage, and advanced motors and magnets. To implement these applications, the availability of low-cost, long-length, and high performance wire/tape and cable is critical. In recent years, there has been considerable interest in mixed lanthanide materials. Phases that are in equilibrium with the superconductor phase, such as  $\text{BaR}_2\text{CuO}_5$ , are popular candidates as flux-pinning agents for enhancing the superconductor properties. Across the lanthanide series,  $\text{BaR}_2\text{CuO}_5$  has two distinct structures, one being tetragonal (R=La, Nd; commonly referred to as the 'brown phase'), while the other is orthorhombic (R=Sm, Eu, Gd, Dy, Ho, Er, Tm, Yb and Lu; commonly referred to as the 'green phase'). As the lanthanide elements have potential to substitute each other and form solid solutions, the goal of this work is to use x-ray diffraction and neutron diffraction methods to study the crystallography and crystal chemistry of  $\text{Ba}(\text{Nd}, \text{Eu}, \text{Gd})_2\text{CuO}_5$ ,  $\text{Ba}(\text{Nd}, \text{Gd})_2\text{CuO}_5$ , and  $\text{Ba}(\text{Nd}, \text{Ho})_2\text{CuO}_5$ . In particular, it is desirable to determine whether a given solid solution composition crystallizes with the 'green' or 'brown' structure type. Reference powder x-ray patterns of selected members have been prepared for inclusion in the Powder Diffraction File (PDF).