

A_{4-x}Nb₆P₄O₂₆: A large family of niobium phosphate bronze (A= K, Rb, Ba)

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Description

Oxides involving a mixed framework built up from MO₆ octahedra and PO₄ tetrahedra in which the transition element M exhibits a mixed valency are interesting for their ability to present strongly anisotropic conductivity. This is the case of the niobium phosphate bronze K₃Nb₆P₄O₂₆ recently synthesized. The aim of the present work was to study the possible non stoichiometry in this phase and the influence of the nature of the interpolate cation as well as that of the transition element on its stability, and on its structural characteristics. Two new families of niobium phosphate bronze A_{4-x}Nb₆P₄O₂₆ (0 ≤ x ≤ 2; A = K, Rb) and 11 bronzoids A₃(Nb,M)₆P₄O₂₆ (A = K, Rb; M = Ti, Fe, Cr, Al) and BaNb₆P₄O₂₆ were isolated. These oxides exhibit the K₃Nb₆P₄O₂₆ structure (1), i.e. are characterized by a mixed framework formed of corner-sharing MO₆ octahedra and PO₄ tetrahedra forming intersecting tunnels where the K ...