Partial Substitution by Y, Pb or Bi in $Sr_8Ca_6Cu_{24}O_{41}$

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$Sr_8Ca_6Cu_{24}O_{41}$ was synthesized by solid-state reaction at 920°C in air. It crystallizes with an incommensurate composite structure, which can be conveniently described by a commensurate superstructure. Structure refinements were carried out in the space group *Cccm* (a = 11.377(1), b = 12.983(1), c = 27.395(2) Å) and the supergroup *P:F*222:-1-11 (a = 11.3745(7), b = 12.9798(9), c_1 = 2.7493(4), c_2 = 3.9132(3) Å, $q = c_1/c_2 = 0.7026$) on powder X-ray diffraction data. It was found that Sr and/or Ca may be replaced by at least 5 wt.% Y, Pb or Bi. These three cations modify in different ways the Cu_2O_3 zigzag chains and CuO_2 straight chains of CuO_4 squares within the layers. In addition, in the case of substitution by yttrium, the translation period along the stacking direction of the layers (b-parameter) decreases. Syntheses with small amounts of PbO or Bi_2O_3 further decrease the decomposition temperature of the phase.

Keywords: cuprate, spin-ladder compound, composite structure