

## On the growth mechanisms of mercury cuprates films

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### Abstract

The elaboration process of Hg-12(n-1)n (HgBa<sub>2</sub>Ca<sub>n-1</sub>Cu<sub>n</sub>O<sub>2n+2</sub>) films is complex and not well understood. We aim to clarify some relevant parameters encountered in their synthesis using the sealed quartz tube technique. In this technique, a precursor film Re223 is placed close to an un-reacted Hg-1223 mercury reservoir. Several experiments show that the position of the film with respect to the precursor is an important parameter. The mercuration process is generally supposed to be driven by the diffusion of the mercury vapor to the precursor films. Our experiments however suggest that solid-solid state reaction must be considered, perhaps as the most efficient path for the reaction formation of these films. We have also observed an important influence of the nature of the substrate. While pure (Hg,Re)-1223 films are obtained on MgO (001), (Hg,Re)-1212 (with some (Hg,Re)-1223 impurities) is generally observed on LaAlO<sub>3</sub> (001). We propose that the nucleation and the kinetic of formation of these Hg-based superconductors is influenced by the mismatch with the substrate.

Acknowledgements This work was partially supported by Rhône-Alpes region: project Rubis (thématique prioritaire matériaux 2000) and CNRS.