

Infrared Absorption Analysis of the Pyrolysis of Trifluoroacetate Precursors of YBCO Superconductors?

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Abstract

Metallorganic decomposition (MOD) of YBa-2Cu-3O-7-x thin films is a very promising methodology for low cost production of coated conductors. The obtention of superconducting thin films by MOD using trifluoroacetates (TFA-MOD) has three steps: pyrolysis, crystal growth and oxygenation. We have investigated the pyrolysis conditions by IR spectroscopy of TFA solutions of stoichiometric composition deposited on SrTiO-3 and LaAlO-3 single crystals. The decomposition kinetics of the YBCO-TFA solution and the separate solutions of Y, Ba and Cu trifluoroacetates have been investigated. The films were pyrolysed at temperatures between 200oC and 500oC and the pyrolysis times were comprised between 30 seconds and 6 hours. At wavenumbers =1600-1800 cm^{-1} the absorption bands of the carboxylate groups of the precursors are detected. From the variation of the intensity of these absorption bands the decomposition of the TFA precursors and its mutual interaction has been determined. The disappearance of the absorption corresponding to the carboxylate groups was observed at the end of the pyrolysis. The relevance of our investigation on the optimization of the production rate of coated conductors will be stressed.

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