Effects of powder granulometry distribution on Ba122 samples' transport properties

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Ba122, with its critical temperature of around 38 K and its high irreversibility field, has drawn significant attention due to its potential in various applications.

In general, concerning the PIT method, a crucial aspect regards the morphological and superconducting properties of the precursor powders and thus the parameters of the process used to obtain them. The optimization route to get a high-performance superconducting sample passes necessarily through the tuning of parameters such as high purity precursors, heat treatment, purity and cleanliness of the grain boundaries which have to guarantee transport properties as good as possible, and granulometry, that must allow a suitable powder particles flow and orientation during the cold deformation.

In this work, we present in detail how to control the particle size distribution of synthesized powders and its impact on transport properties. This can be achieved by adding a potassium excess to the element mixture [1] or adjusting the particle size of the starting materials (e.g., iron). Powders are obtained through the single-step reaction process developed at CNR-SPIN in Genoa in collaboration together with CERN HFM project.

Our findings are relevant for PIT wire fabrication, where grain size strongly affects both mechanical deformation and transport properties.

[1] Emilio Bellingeri et al 2024 Supercond. Sci. Technol. 37 095014

Acknowledgements

This work is performed within the scope of The Addendum N.3 KE5814/TE to The Memorandum Of Cooperation For The High field Magnet (HFM) Research And Development Programme KN5623 between SPIN Institute of the National Research Council of Italy and European Organization for Nuclear Research (CERN).

The research infrastructure used in this work is part of the project IR0000003 - IRIS supported by the NextGeneration EU-funded Italian National Recovery and Resilience Plan with the Decree of the Ministry of University and Research number 124 (21/06/2022) for the Mission 4 - Component 2 - Investment 3.1.