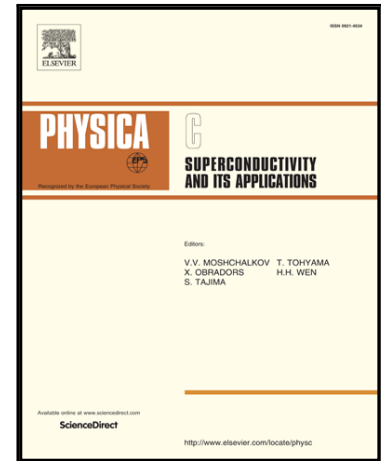


# Accepted Manuscript

Control of in-field performance of 25 mol.% Zr-added REBCO superconductor tapes

M. Heydari Gharahcheshmeh , G. Majkic , E. Galstyan , A. Xu , Y. Zhang , X-F. Li , V. Selvamanickam

PII: S0921-4534(18)30100-X  
DOI: [10.1016/j.physc.2018.07.004](https://doi.org/10.1016/j.physc.2018.07.004)  
Reference: PHYSC 1253377



To appear in: *Physica C: Superconductivity and its applications*

Received date: 1 March 2018  
Revised date: 16 July 2018  
Accepted date: 31 July 2018

Please cite this article as: M. Heydari Gharahcheshmeh , G. Majkic , E. Galstyan , A. Xu , Y. Zhang , X-F. Li , V. Selvamanickam , Control of in-field performance of 25 mol.% Zr-added REBCO superconductor tapes, *Physica C: Superconductivity and its applications* (2018), doi: [10.1016/j.physc.2018.07.004](https://doi.org/10.1016/j.physc.2018.07.004)

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

## Highlights

- A promising approach for manufacturing of advanced functional materials for energy applications involves the spontaneous growth of self-assembled nanostructures in thin films.
- In the case of state-of-the-art  $\text{REBa}_2\text{Cu}_3\text{O}_{7-\delta}$  (REBCO and RE=Gd, Y) superconductors, introduction of self-assembled  $\text{BaZrO}_3$  (BZO) nanorods significantly improves their performance in applied magnetic fields. Chemical composition of REBCO and its lattice parameter mismatch relative to BZO have been found to play a significant role in this respect.
- In this study, the relation between the c-axis lattice parameter of REBCO films with 25 mol.% Zr addition and the critical current density ( $J_c$ ) was investigated at (77 K, 0 T), (30 K, 3 T ( $B\parallel c$ )), and (30 K, 9T ( $B\parallel c$ )).
- An increase in REBCO c-axis lattice parameter and a decrease in elastic mismatch strain relative to self-assembled BZO nanocolumns were observed with increasing (Ba+Zr)/Cu content.
- The reduction in elastic mismatch strain was found to be the driving force behind the growth of the desired continuous self-assembled BZO nanocolumns along the entire film thickness which in turn led to an improvement of in-field  $J_c$  at 30 K.
- The optimum c-axis lattice parameter for achieving the highest  $J_c$  in magnetic field was found to be temperature and field dependent, with optimum values of 11.74, 11.76 and 11.78 Å at (77 K, 0 T), (30 K, 3 T ( $B\parallel c$ )), and (30 K, 9T ( $B\parallel c$ )), respectively.

Download English Version:

<https://daneshyari.com/en/article/8163827>

Download Persian Version:

<https://daneshyari.com/article/8163827>

[Daneshyari.com](https://daneshyari.com)