

EFFECT OF NANO-SIZE SnO₂ ADDITION ON (Bi,Pb)-Sr-Ca-Cu-O SUPERCONDUCTOR

A. Agail and R. Abd-Shukor

*School of Applied Physics, Universiti Kebangsaan Malaysia,
43600 Bangi, Selangor, Malaysia*

Corresponding author: ras@ukm.my

ABSTRACT

In this study the influence of nano-SnO₂ particles addition on the critical current density (J_C) in Bi_{1.6}Pb_{0.4}Sr₂Ca₂Cu₃Sn_xO₁₀ superconductor ceramic with x ranging from 0 to 0.05 was investigated. The samples were prepared using the co-precipitation technique with sintering time of 48 h at 850°C. The characterizations were carried out using DC resistivity measurement, X-ray diffraction (XRD) and scanning electron microscopy (SEM). The critical current density, J_C and the transition temperature, $T_{C-onset}$ for sample with 0.02 wt% were found to be the highest with a maximum J_C 1212 mA/cm² and a maximum $T_{C-onset}$ 112 K. XRD and SEM analysis indicated that nano-SnO up to 0.02% wt enhance the formation of low- T_C (Bi-2212) phase fraction.

Keywords: Nano-SnO; Bi_{1.6}Pb_{0.4}Sr₂Ca₂Cu₃Sn_xO₁₀

REFERENCES

- [1]. H. Maeda, Y. Tanaka, M. Fukotomi and T. Asano, *Jpn. J. Appl. Phys.*, **27**, 209-210 (1988).
- [2]. J. M. Tarascon, Y. LePage, L. H. Greene, B. G. Bagley, P. Barboux, D. M. Hwang, G. W. Hull, W. R. Makinnon and M. Giroud, *Phys. Rev. B* **38**, 2504-2508 (1988).
- [3]. K. Kuniyuki, K. Satoshi and N. Seiichiro, *Jpn. J. Appl. Phys.* **29**, 53-56 (1990).
- [4]. S. X. Dou, H. K. Liu, J. Wang, M. H. Apperley, C. C. Sorrell, S. J. Guo, B. Loberg and K. E. Easterling, *Physica C* **172**, 63-70 (1990).
- [5]. T. Sakai, H. Utsunomiya, Y. Saito, T. Hanamachi and M. Shinkawa, *Physica C* **277**, 189-195 (1997).
- [6]. Z. Jia, Y. H. Tang, Z. Q. Yang, Y. T. Xing, Y. Z. Wang and G. W. Qiao, *Physica C* **337**, 130-132 (2000).
- [7]. T. Haugan, W. Wong-Ng, L.P. Cook, H. J. Brown, L. Swartzendruber, D.T. Shaw, *Physica C* **335**, 129-133 (2000).
- [8]. Y. Zaho, C.H. Cheng, J.S. Wang, *Supercond. Sci. Technol.* **18**, 43-46 (2005).
- [9]. A. Mellekh, M. Zouaoui, F. B. Azzouz, M. Annabi, M. B. Salem, *Solid State Commun.* **140**, 318-323 (2006).

- [10]. F. B. Azzouz, M. Zouaoui, A. Mellekh, M. Annabi, G. Van Tendeloo and M. B. Salem, *Physica C* **455**, 19-24 (2007).
- [11]. B. Zhao, X. Wan, W. Song, Y. Sun and J. Du, *Physica C* **337**, 138-144 (2000).
- [12]. E. Guilmeau, B. Andrzejewski, and J. G. Noudem, *Physica C* **387**, 382-390 (2003).
- [13]. M. Zouaoui, A. Ghattas, M. Annabi, F. B. Azzouz and M. B. Salem, *Supercond. Sci. Technol.* **21**, 125005 (2008).
- [14]. K. T. Lau and R. Abd-Shukor, *J. Appl. Phys.* **99**, 123904 (2006).
- [15]. M. Annabi, A. m'chirgui, F. B. Azzouz, M. Zouaoui and M. B. Salem, *Physica C* **405**, 25-33 (2004).
- [16]. R. K. Nkum and W. R. Datars, *Superconductor Science and Technology* **8**, 822-826 (1995).