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The high-field transport property of Sm-Ba-Cu-O bulk materials with different nano-scale additions Y.C. LIAO, Department of Physics, National Tsing Hua University, Hsinchu, Taiwan., S.Y. CHEN, Institute of Physics, Academia Sinica, Taipei, Taiwan., I.G. CHEN, Department of Materials Science and Engineering, National Cheng Kung University, Tainan, Taiwan., M.K. WU, Institute of Physics, Academia Sinica, Taipei, Taiwan. — The nano-scale additions, such as, RE_2BaCuO_5 (RE= Y, Sm, and Nd) particles, in the melt-textured-growth Sm-Ba-Cu-O bulk material can enhance the critical current density (J_C),especially in high magnetic field. These particles contribute to the nano-scale composition fluctuation and thus the variation of T_C in a nano-scale. The δT_C pinning is the reason of high-field peak effect in J_C(H). We found that there are two characteristic temperatures shown in the high-field (2$\sim$ 7 tesla) R(T) curves in the sample with the peak effect. This is in contrast to the sample without the nano-scale additions, which exhibits only one transition temperature. It suggests that there are two different regimes with varying superconducting transitions in the former sample. The detailed mechanism of this behavior will be discussed.

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