

## Nanoscale stripe structures in $\text{SmBa}_2\text{Cu}_3\text{O}_x$ superconductors

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AFM and STM scans on  $\text{SmBa}_2\text{Cu}_3\text{O}_x$  (SmBCO) melt-processed samples prepared using different techniques revealed the presence of nanoscale stripe-like structures, sometimes parallel over several micrometers, sometimes wavy. These structures consist of chemical compositional fluctuations and act as effective  $\delta T_c$ -pinning centers due to their wavelength of typically 10-60 nm which is comparable to the ideal pinning-center size of  $2\xi$  ( $\sim 10$  nm for  $\text{YBa}_2\text{Cu}_3\text{O}_x$  in the ab-plane). Compared to similar structures in ternary (Sm,Eu,Gd) $\text{Ba}_2\text{Cu}_3\text{O}_x$  (SEG) and (Nd,Eu,Gd) $\text{Ba}_2\text{Cu}_3\text{O}_x$  (NEG)) systems, where the stripes appear either as plateau-like stripes or as chains of aligned clusters, the stripes in SmBCO always appear as plateau-like stripes with a height of  $1\text{\AA} - 8\text{\AA}$ . These pinning structures throughout the whole sample volume may be a key to improve critical current densities especially at high external magnetic fields.