Nanoscopic netted structure of compositional modulation in $(Sm_{0.33}Eu_{0.33}Gd_{0.33})Ba_2Cu_3O_{7-\delta}$ superconductors

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We report a nanoscaled crisscross network in high-quality melt-processed $(Sm_{0.33}Eu_{0.33}Gd_{0.33})Ba_2Cu_3O_{7-\delta}$ superconductors investigated with atomic force microscopy (AFM) and transmission electron microscopy. In the ten-micrometer scale, such a net was unveiled as a consequence of crossing annular stripes originating from ordering compositional modulation. The AFM topographic images further displayed that this compositional stripe result in a surface modulation with a few-nanometer wavelength and roughness. The forming mechanism of this compositional stripe and its role as strong δT_c-type pinning defects were discussed in the context of rare earth/Ba oscillation around the stoichiometric ratio and the spatial fluctuation of local T_c values.