Observation of Two Length Scales for Phase Separation in $(La_{5/8-0.3}Pr_{0.3})Ca_{3/8}MnO_3$

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Using *in-situ* scanning tunneling microscopy/spectroscopy, we have observed both large-scale (> a few tens nanometers) and nano-scale electronic phase separation (PS) in epitaxially grown thin films of $(La_{5/8-0.3}Pr_{0.3})Ca_{3/8}MnO_3$. While the large PS domains are present only below the Curie temperature (T_c), the nano-scale PS clusters exist at temperatures both below and above T_c, which implies that the small clusters may originate from doping-related disorder. This is consistent with the theory showing that "quenched disorder" is the driving force for the appearance of large-scale PS in maganites. This work is sponsored by Oak Ridge National Laboratory, managed by UT-Battelle, LLC, for U. S. Dept. of Energy.

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