VISUALIZATION OF THE ANTIFERROMAGNETIC INSULATOR - FERROMAGNETIC METAL PHASE TRANSITION IN THE MANGANITE $Nd_{0.5}Sr_{0.5}MnO_3$

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9.7 cm

It has been found that the first order phase transition from an antiferromagnetic (AFM) metallic state to a ferromagnetic (FM) insulating state in the manganite $Nd_{0.5}Sr_{0.5}MnO_3$ is accompanied by a significant change of reflectivity of visible light. The reflection coefficient of the FM phase is approximately twice as large as the coefficient of the AFM phase for light with a wavelength of 633 nm. This effect has been used for the visualization of the AFM-FM phase transition in $Nd_{0.5}Sr_{0.5}MnO_3$. The coexistence of AFM and FM phases was visually observed during the spontaneous and field-induced AFM-FM transition. In both cases, the transition occurred by nucleation and expansion of domains of the energetically favorable phase. However, the periodic domain structure of magnetic intermediate state was not observed. The $H - T$ phase diagram of $Nd_{0.5}Sr_{0.5}MnO_3$ manganite was constructed using the visual observations and reflectivity measurements in fields up to 40 kOe. It should be noted that a stripe domain structure was observed in the AFM state whereas the FM state was observed to be uniform.

13.4 cm

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