

Orbital Glass State And Magnetic Anomalies In CoV_2O_4

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In this paper, we investigate the electric, magnetic, structural and thermal properties of spinel CoV_2O_4 . Temperature dependence of magnetization shows that in addition to the para-magnetic to ferrimagnetic transition at 142 K two magnetic anomalies exist at 100 K, 59 K. Consistent with the anomalies the thermal conductivity presents two valleys. The heat capacity shows one peak at 59 K, which can not be attributed to the structural transition as revealed by the X-ray diffraction patterns for CoV_2O_4 . The AC susceptibility displays the characters of spin glass below the transition temperature $T_1 = 59$ K. By means of the super-exchange mechanism, the phase transition at 59 K is found to be para-orbital to orbital glass transition, which is in agreement with the experimental results. As the Zn^{2+} doping contents increases on A sites, the magnetic anomaly, the valley in thermal conductance and the spin glass behaviors around T_1 becomes weakening to vanishing, which implies the gradual melting of orbital glass.