Magnetization Plateaux in S=1 Spin Ladder

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9.7 cm

Recently the organic compound BIP-TENO is synthesized and found the first $S = 1$ spin ladder. In this compound, a plateau-like anomaly was observed at 1 of the saturation magnetization in the previous magnetization measurement. The present high-field measurement up to 70T confirmed that it is an evident plateau and successfully observed not only the plateau-beginning field (45T) but also the plateau-ending field (66T). We also propose possible mechanisms of the 1 plateau in BIP-TENO. The frustration in the first, second and third neighbor antiferromagnetic exchange interactions in the $S = 1$ ladder yields the 1 plateau, with a spontaneous translational symmetry breakdown. This can be known by use of the degenerate perturbation theory from the strong rung coupling limit. Several precise phase diagrams in the ground state at 1 of the saturation magnetization are also presented, using the exact diagonalization for finite clusters and the recently developed level spectroscopy analysis. Fitting the theoretical magnetization curve and the temperature dependence of the susceptibility to the experimental results, we specify the most realistic mechanism of the 1 plateau in BIP-TENO.

13.4 cm

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