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Title

Singlet-Triplet Excitations and High-Field Magnetization in CuTe(2)O(5)

Source

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Abstract

By measuring the THz electron spin resonance (ESR) transmission spectra and high-field magnetization on the spin-gapped system CuTe(2)O(5), we identified the singlet-triplet excitations in the dimerized non-magnetic ground state. The determined spin-gap value of h(upsilon 0) = 4.94 meV at the Gamma point (Q similar or equal to 0) is significantly smaller than the strongest antiferromagnetic exchange interaction between the Cu ions predicted by theoretical investigations. We also observed the critical field H(c1)(a) = 37.6 T for H perpendicular to bc-plane and H(c1)(bc) = 40.6 T for H parallel to bc-plane at the onset of non-zero magnetization, consistent with the gap value and corresponding anisotropic g-factors determined previously. The observed singlet-triplet excitations in Faraday and Voigt configurations suggest a mixing of the singlet state with the S(z) = 0 triplet state and the S(z) = +/- 1 triplet states, respectively, due to the Dzyaloshinskii-Moriya (DM) interaction with a DM vector perpendicular to the crystalline bc-plane.