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Colossal Directional Dichroism in a Multiferroic CuB_2O_4 SHINGO TOYODA, NOBUYUKI ABE, Univ of Tokyo, SHOJIRO KIMURA, Tohoku University, YASUHIRO H. MATSUDA, TOSHIHIRO NOMURA, AKIHIKO IKEDA, SHOJIRO TAKEYAMA, TAKA-HISA ARIMA, University of Tokyo — In multiferroic materials, electric and magnetic responses to light can interfere with each other, resulting in novel optical phenomena. One typical example is directional dichroism, where the absorption coefficient changes with the reversal of the propagating direction of light. It has been reported that CuB_2O_4 shows giant directional dichroism at 1.40 eV, which corresponds to the intratomic from $d_{x^2-y^2}$ to d_{xy} transition of Cu^{2+} hole. The optical absorption coefficient changes by a factor of three at low magnetic fields. In this study, we investigated magnetic field dependence of directional dichroism up to 52 T. We have observed colossal directional dichroism where the ratio of the optical absorption coefficient is as large as 1000% at 52 T. The observed extraordinary large directional dichroism is explained by a modification of the electric and magnetic dipole transition moments due to the canting of the spin direction of Cu^{2+} hole by the application of a high magnetic field.

Shingo Toyoda
Univ of Tokyo-Kashiwanoha

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