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Magnetostriction and thermal expansion on 1D chain compound Azurite FREDERIK W. FABRIS, VIVIEN ZAPF, SONIA FRANCOUAL, MARCELO JAIME, ALEX LACERDA, National High Magnetic Field Laboratory, Los Alamos, New Mexico 87545, USA, NHMFL-LANL TEAM — Azurite is a natural mineral with a chemical structure $Cu_3(OH_2)(CO_3)_2$. This compound is a frustrated triangular quantum magnet consisting of Cu S=1/2 atoms arranged alternately to form infinite chains along the b axis. The magnetic behavior of this compound reflects the existence of both monomers and dimers of S = 1/2 Cu. A magnetization plateau at 1/3 of the saturization magnetization is observed in M vs H measurements between 11 and 30 T due to saturization of the monomers. For fields above the plateau, the magnetic field energy exceeds the dimer bonding and thus the dimers cant and then align with the field. The magnetic structure and the detailed phase diagram in temperature and field are largely unknown or controversial. A recent report [1] in the specific heat behavior suggests a more complicated structure than previously thought. In addition, recent ultrasound measurements [2] indicate significant magnetoelastic coupling must be taken into account. We have acquired interesting results on magnetic torque, magnetostriction and thermal expansion. We have demonstrated that significant, anisotropic magnetostriction occurs in azurite, giving us an indication of the magnetically induced structural distortions. [1] Yasu Takano, personal communication. [2] Lang et al, J. Phys.: Conf. Series 51, 1, (2006).

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