Experimental study of mixed system $Cs_3Cu_3Cl_{8-x}Br_xOH$ with weakly connected Cu-triangles

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To study the relationship between the properties of low-dimensional spin systems with weakly coupled Cu-triangles and their crystal structure, the new mixed system was prepared. The investigation was carried out on two single crystals of the mixed system $Cs_3Cu_3Cl_{8-x}Br_xOH$: $Cs_3Cu_3Cl_8OH$ (1) and the new $Cs_3Cu_3Cl_{7.6}Br_{0.4}OH$ (2), which were grown from aqua solution.

These compounds are a model material for studying the magnetic structure of trimer units with weakly connected Cu-triangles [1]. Interest in such systems is not only confined to the geometrical frustration, but also to some fundamental phenomena in magnetism like spin-canting, metamagnetic transition and spin-flop transition.

Both compounds are isostructural and crystallize in a monoclinic structure with space group *P*21/*c*. The magnetic susceptibility of (1) shows a maximum at 2.23 K and of (2) at 2.70 K, which are attributed to antiferromagnetic phase transitions. Furthermore, the magnetization along the b-axis at 1.9 K for both compounds shows a spin-flop transition into a new antiferromagnetic phase. This transition occurs at 0.61 T for (1) and at 2.0 T for (2). The antiferromagnetic order can be suppressed by a magnetic field B_{C1}= 1.1 T for (1) and B_{C2}= 1.2 T for (2). First single crystal neutron diffraction measured on (1) at different temperatures reveals the magnetic signal on the top of the nuclear reflection at (-1 0 0). Its magnetic ordering temperature was found to be at T_{N1}= 2.12(3) K [2].

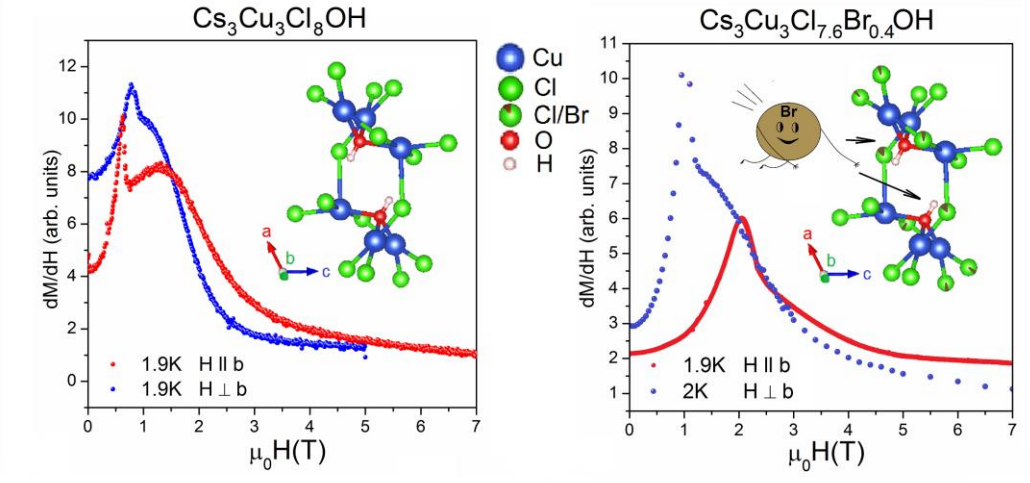

Figure 1: Magnetization with a magnetic field parallel and perpendicular to the *b*-direction: (left) of (1) dM/dH vs. H at 1.9 K, (right) of (2) at 1.9 K and 2.0 K for dM/dH vs. H below the temperature of the AFM phase transition

[1] W. Guo, Y. Tang, S. Zhang, H. Xiang, M. Yanga, Z. He, *CrystEngComm,* 17, 8471-8476 (2015)
[2] N. van Well, M. Bolte, C. Eisele, L. Keller, J. Schefer, S. van Smaalen, *Journal of Physics and Chemistry of Solids,* 140, 109386 (2020)

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