The Magnetic phase diagram of the spin-chain system $\text{Ca}_{2+x} \text{Y}_{2-x} \text{Cu}_5 \text{O}_{10-\delta}$: Oxygen hole-doping

KEESEONG PARK, Department of Physics, The University of Texas at Austin, JOHN MARKERT, Department of Physics, The University of Texas at Austin — Recently, K. Kudo et al.\textsuperscript{1} studied the magnetic ground state in the edge-sharing $\text{CuO}_2$ chains in the spin-chain system $\text{Ca}_{2+x} \text{Y}_{2-x} \text{Cu}_5 \text{O}_{10-\delta}$. In that study, the antiferromagnetic transition temperature decreases with increasing $x$ and disappears around $x=1.4$ followed by the appearance of a spin-glass phase at $x=1.5$. We propose that the oxygen content should be included in the hole doping effect by $p = 1/5(x - 2\delta)$ in the spin-chain system. We present x-ray diffraction, magnetic susceptibility, specific heat and iodometric titration measurements\textsuperscript{2} which indicate that an oxygen deficiency shifts the magnetic features toward higher $x$. For example, for $x = 1$ samples, the single crystals of Ref.1 are equivalent to our oxygen deficient polycrystalline sample with $\delta \approx 0.5$. Such a composition has an only slightly suppressed Néel temperature, while for nearly fully oxygenated $x = 1$ samples, the antiferromagnetic transition is completely suppressed.\textsuperscript{3}

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\textsuperscript{3}M. D. Chabot, and J. T. Markert, Physical Review Letters \textbf{86}, 163 (2001)