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Magnetization steps on the spin liquid ground state of the S= 1/2 kagome-like antiferromagnet $Cu_3V_2O_7(OH)_2 2H_2O$ HIROYUKI YOSHIDA, YOSHIHIKO OKAMOTO, TAKASHI TAYAMA, TOSHIRO SAKAKIBARA, MASASHI TOKUNAGA, AKIRA MATSUO, YASUO NARUMI, KOICHI KINDO, MAKOTO YOSHIDA, MASASHI TAKIGAWA, ZENJI HIROI, ISSP, Univ. of Tokyo, VOLBORTHITE COLLABORATION — The ground state of the $S = 1/2$ kagome antiferromagnet (KAFM) is expected to be a spin liquid with a finite spin gap $\Delta \sim J / 20$. Here, we report the magnetic properties of $S = 1/2$ KAFM $Cu_3V_2O_7(OH)_2 \cdot 2H_2O$ studied by magnetization, specific heat and V NMR measurements. Neither magnetic long- range order nor a spin gap has been detected down to 60 mK, in spite of a large antiferromagnetic interaction $J = 86$ K, suggesting a gapless spin liquid. Surprisingly, we observed three step-like increases in magnetization at $H_{S1} = 4.3$, $H_{S2} = 25.5$, and $H_{S3} = 46$ T, which implies that there exist at least four kinds of spin liquid or other quantum state under magnetic fields.

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