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Exotic quantum magnetization process observed in the {Cu_3} triangular spin ring K.-Y. CHOI, Department of Chemistry and Biochemistry, FSU, Tallahassee, FL 32306, USA, A. P. REYES, P. L. KUHNS, NHMFL/FSU, Tallahassee, FL 32306-4390, USA, N. S. DALAL, Department of Chemistry and Biochemistry, FSU, Tallahassee, FL 32306, USA, Y. H. MATSUDA, H. NOJIRI, IMR, Tohoku University, Katahira 2-1-1, Sendai, Japan, F. HUSSAIN, U. KORTZ, School of Engineering and Science, IUB, Bremen, Germany — We present a comprehensive set of pulsed field magnetization, ESR, and NMR measurements on the triangle spin ring system $[Cu_3(H_2O)_3(\alpha\text{-}XW_9O_{33})_2]^{12-}$(X=As, Sb). We observed half step magnetization and hysteresis loops for X=As in a fast sweeping magnetic field of $\sim 10^4$T/s at 0.4 K. These features become less pronounced for X=Sb. A comparative ESR study of both compounds reveals that Dzyaloshinskii-Moriya (DM) interactions are weaker in X=Sb than X=As because of the size difference between the diamagnetic heteroatom X. This leads to a reduction of an anti-level crossing gap in X=Sb compared to X=As. This is consistent with the NMR results which show an appreciable peak of the spin-lattice relaxation rate $1/T_1$ at anti-level crossing fields of 2 and 4.4 T only for X=Sb. Our work suggests that the dependence of half step magnetization on X in a nanocluster system arises from a delicate balance between the adiabatic magnetization and the relaxation rate, relying on DM interactions.

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