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Tunable Finite-Sized Iron Chains to Control Magnetic Relaxation in Phthalocyanine[1] THOMAS GREDIG, MATTHEW BYRNE[2], California State University Long Beach — The magnetic dynamics of low-dimensional iron ion chains have been studied using iron phthalocyanine thin films. The deposition temperature limits the average crystal size in the range from 40 nm to 110 nm, allowing for tunable control of the chain length. Using a method common for single chain magnets, the magnetic relaxation time for each chain length is determined from temporal remanence data fit to a stretched exponential form in the temperature range below 5 K, the onset for magnetic hysteresis. Scaling the remanence by its relaxation time generates a temperature-independent master curve to fit the spin reversal energy barrier and single spin relaxation time. The energy barrier of 95K is found to be independent of the chain length. In contrast, the single spin relaxation time increases with longer chains. Both results are interpreted with the Glauber-Ising framework in the regime where the correlation length exceeds the chain length. We show that thin films provide the nano-architecture to control magnetic relaxation and a testbed to study finite-size effects in low-dimensional magnetic systems.

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