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Charge-ordering in $FePd_3$ artificial kagome ice JASPER DRISKO, STEPHEN DAUNHEIMER, JOHN CUMINGS, University of Maryland, College Park — Artificial spin ices (ASIs) are arrays of lithographically-patterned, Ising-like nanomagnets built-by-design to be geometrically frustrated. ASI has proven to be a novel and powerful tool for studying the effects of frustration due to its success in modeling real frustrated materials like spin ice, its highly tunable nature, and its amenability to a variety of techniques to directly characterize exact spin configurations. A fundamental question for frustrated systems is how they find long-range ordered states or whether this is even possible at all in the presence of frustration. In this work we investigate theoretical predictions of charge-ordering in the kagome ice-II state [1]. We employ ASI fabricated from $FePd_3$, which has a relatively low Curie temperature and thus easily allows for thermally activated reversal of individual spins. We have fabricated samples with magnets of varying lengths and investigate them using Lorentz Transmission Electron Microscopy. Samples are heated above their Curie temperature and cooled slowly back to room temperature, allowing the macro-spins to interact, flip, and relax during the cooling process. We find that shorter lattice constant samples tend to exhibit better ordering of magnetic charges after cooling. We have also performed simulations of our samples using a kinetic Monte Carlo technique. We find very good agreement between the simulations and experiment when we incorporate a disordered spread of magnet widths into the simulations, representative of our real samples due to lithography artifacts.

[1] G.-W. Chern et al., *Phys. Rev. Lett.* **106**, 207202 (2011)

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