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Magneto-optical and magneto-transport studies of hexagonal artificial spin ice nano-structures SIMON OLIVARI, KANE ESIEN, DAN READ, Cardiff University — Artificial spin ice structures have attracted a great deal of attention recently and may prove to be useful analogues for frustrated magnetic systems, such as bulk spin ice materials. We will present the results of studying these structures by utilising magneto optical Kerr effect (MOKE) and magneto-transport measurements. We have fabricated hexagonal (also sometimes known as honeycomb) ASI structures from metallic ferromagnetic islands having dimensions close to 1 μm long, 100nm wide and 10nm thick. We have made electrical transport measurements of two types of structure both having similar geometry and electrically connected islands, however the first samples have magnetically connected elements forming the honeycomb networks whereas the second set of samples are formed from magnetically isolated islands. Comparing these structures allows an assessment of the relative contributions from magnetic domain wall (DW) motion and from magnetostatic interactions. The magneto-optical measurements have been made as a function of angle between the field direction and the lattice. The properties observed with NiFe and Co fabricated nanostructures are discussed in relation to the geometries described above.

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