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Magnetic Nanocheckerboards with Tunable Sizes in the Mn-Doped $CoFe_2O_4$ Spinel CHENGLIN ZHANG, Rutgers Center for Emergent Materials and Department of Physics & Astronomy, Rutgers University, Piscataway, New Jersey 08854, USA, C.M. TSENG, C.H. CHEN, Center for Condensed Matter Sciences, National Taiwan University, Taipei 10617, Taiwan, S. YEO, Y.J. CHOI, S.-W. CHEONG, Rutgers Center for Emergent Materials and Department of Physics & Astronomy, Rutgers University, Piscataway, New Jersey 08854, USA — In the Mn-doped $CoFe_2O_4$ spinel, a highly ordered array of two types of rectangular nanorods, $\sim$300 nm in length and a few nanometer in size, is achieved through chemical phase separation mediated by cooperative Jahn-Teller distortions. At room temperature, the magnetic nanorods with composition close to $CoFe_2O_4$ interlace with the paramagnetic counterparts and form a highly organized checkerboard pattern in the cross section. The checkerboard size, varying in the range of $\sim$3 nm and $\sim$80 nm, is tunable with composition as well as with the isothermal annealing time This may be of potential significance to the next generation magnetic storage. The magnetic nanocheckerboards exhibit a nearly ideal configuration for perpendicular recording media.

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