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Synthesis and characterization of hard/soft bimagnetic nanoparticles[1] VIKAS NANDWANA, GIRIJA SHANKAR CHAUBEY, KAZUAKI YANO, J. PING LIU, Department of Physics, University of Texas at Arlington — Bimagnetic nanoparticles are synthesized from high-temperature solution method by growing soft magnetic phases on a hard magnetic phase. The hard phase is chosen as the FePt phase and the soft phases include Fe_3O_4, $CoFe_2O_4$ and FeCo. The soft phases can be coated or attached to the hard phase by changing reaction conditions. When the soft phases are coated on the hard phase, core/shell structured bimagnetic nanoparticles are formed; when the soft phases are attached to the hard phase, brick-like bimagnetic nanoparticles are formed. Magnetic properties of these nanoparticles are affected by dimensions of the soft and hard components due to the exchange coupling between them. Upon reductive annealing, an assembly of the bimagnetic nanoparticles is transformed into a hard magnetic nanocomposite with enhanced energy product which is 35% higher than single FePt phase. With proper choice of materials and dimension of both phases, these bimangetic nanoparticles may be used as building blocks for novel functional nanomaterials for various applications.

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