

structure, dipole interactions, inter-particle interactions, exchange anisotropy [3]. Among the proposed mechanisms, the core-shell concept is world wide accepted to explain the features of nanoparticle magnetism. In a magnetic nanoparticle the central part, known as core, is assumed to be identical to the structure and property of bulk material with micron sized particles. The structure and property of the outer part of the particle, known as shell, are drastically different in comparison with core [3, 4]. If the bulk material is a typical long ranged ferromagnet (antiferromagnet), then core is assumed to be long ranged ferromagnet(antiferromagnet) and disorder is introduced in the shell part of the particle. This means the property of a magnetic nanoparticle is basically heterogeneous in character (i.e., consisting of two different magnetic components or equivalent to two magnetic sublattices) over a length of particle dimension and also in the whole dimension of the material when the particles are in contact. The common phenomena due to the heterogeneous magnetic structure in ferromagnetic nanoparticles are the reduction of particle moment and magnetic blocking/freezing at lower temperatures. On the other hand, antiferromagnetic nanoparticles have shown many enhanced properties mainly due to different magnetic structure of shell part in comparison with bulk counter material [4]. This shows that core-shell structure plays an important role in the properties of magnetic materials, immaterial of ferromagnetic or antiferromagnetic particles. Hence, proper understanding of the effects of core-shell structure is not only the long standing problem, but also useful in designing the application oriented materials. To understand the effects of core-shell structure in different types heterogeneous magnetic structures, e.g., ferromagnetic core is surrounded by antiferromagnetic/paramagnetic/ferrimagnetic shell or antiferromagnetic core is surrounded by ferromagnetic/ferrimagnetic shell have been synthesized and reported in literature [5–8]. The effect of shell disorder and spin frustration has also been discussed in many spin-bilayer magnetic systems [3]. G. Bouzerar et al. [9] discussed the effect of competition between introduced superexchange (antiferromagnetic) interactions in long ranged double exchange ferromagnetic matrix. They argued that in the lower limit of antiferromagnetic superexchange interactions the long ranged ferromagnetic state is not altered significantly; rather a canted ferromagnetic phase or induced new magnetic phase is appeared in the spin system. The induced magnetic phases may be either stable or unstable depending on the quantum of magnetic disorder and frustration. Some report also studied core-shell structure in a composite material consisting of ferrimagnetic core and ferroelectric shell [10].