Multifunctional nanoparticles have already shown great potential in biological applications, such as magnetic resonance imaging (MRI) contrast agents and cell tracking. However, the expensive MRI instruments, traditional complex and toxic-materials involved NP synthesis methods and integration procedures limit the further exploration into biological systems. Here, we propose a novel multifunctional nanostructure as a dual-imaging probe for bio-system. This integrated material consists of “green-chemistry” made iron oxide NPs as magnetic components for MRI contrast agents and biocompatible fluorescent Ag nanoclusters as bio-imaging tools. To our best knowledge, study of this specific nanostructure has not been reported yet. Currently, we had already synthesized monodispersed iron oxide nanoparticles with polyacrylic acid coatings on the surface, which were used as further templates for forming Ag nanoclusters. The subsequent Ag nanocluster attachment was successful, proven by the TEM images, but the fluorescent signal was relatively low. For the future work, we will focus on synthesizing the optimized multifunctional nanostructures with improved fluorescence. Also, controlling hydrodynamic size distribution, study of fluorescent properties, cell-toxicity of integrated NPs and conjugating NPs with interested biomaterials will be preceded in the future.