

Editorial

The advancement in nanoscience and nanotechnology in the present century is revolutionizing common man's life. The emphasis is on miniaturization. The highly interdisciplinary nature of nanoscience has greatly influenced the boundaries of different disciplines like physics, chemistry, biology or engineering to overlap. The field is steadily maturing and expanding to influence almost everything dealing with materials. Just to name a few, nano materials have made inroads in products like sunscreen, paints, soft ferrites, ferrofluids, medicine, piezoelectric materials, inks, semiconductors and adsorbents. The increasing applications of nanomaterials have opened up new nanoscience-based business propositions.

Iron oxides/hydroxides in nano scale form a class of materials having diverse applications in almost all the fields mentioned above. Nano iron oxides exhibit very different magnetic properties which are being exploited for soft ferrites and biomedical applications including drug delivery and magnetic resonance imaging. Superparamagnetic iron oxide nanoparticles can only be magnetized in the presence of an external magnetic field, which makes them capable of forming stable colloids in a physiological medium and hence useful for biomedical applications. The main objective of this special issue is to publish original research work related to the synthesis and characterization of nano iron oxides/hydroxides/oxyhydroxide and iron composites and their probable applications.

There are 14 papers in this special issue. The first, second and tenth papers deal with synthesis and characterization of nano iron oxide, CNT-ferrihydrite composite and goethite using different techniques and the prepared nano powders are tested as adsorbents for removal of fluoride, arsenic or cations from aqueous solutions. The third paper focuses on a very interesting subject on identification of iron oxides in some Ayurvedic heamatinic medicines. The fourth paper has been devoted to synthesis of maghemite (γ -Fe₂O₃) nanoparticles following microemulsion-precipitation technique with a view to have possible application for biotagging. The material shows quite interesting magnetic properties such as dependence of superparamagnetism on measurement techniques. The fifth paper describes synthesis of Fe_{3(1-x)}Co_{3x}O₄ (x = 0.1, 0.3 and 0.5) spinel ferrite using the techniques of mechanical alloying, high temperature annealing of milled samples and conventional solid state sintering. The comparative results of the crystal structure formation and dielectric properties of the materials are discussed. Sixth paper deals with the fabrication of nanostructured and mesoporous iron-cerium mixed oxides for photocatalytic degradation of phenol, methylene blue, and congo red. Electrodeposition technique employed for preparation of Fe-Fe oxide nanoparticles has been presented in the seventh paper. The prepared sample was evaluated for its magnetic structure. Citrate precursor-calcination route was followed to synthesize Ni_{0.5}M_{0.5}Fe₂O₄ (M = Co, Cu), Ni_{0.5}Zn_{0.5}Fe₂O₄ and chromium ferrite nanoparticles and the results are presented in eighth, ninth and eleventh papers. Magnetic and structural properties of the prepared nano ferrites have been reported in these papers. Paper 12 presents a brief review on prominent occurrence of iron oxides at KTB mass extinction. Paper 13 is devoted to the characterization of γ - and α -Fe₂O₃ nano powders synthesized by emulsion precipitation-calcination route and rheological behaviour of α -Fe₂O₃. Finally in paper 14 synthesis and applications of nano structured iron oxides/hydroxides have been reviewed.

As editors of this special issue, we believe that each of these papers provides valuable information and the sum of their contributions to recent advancement in synthesis, characterization and applications of nano iron oxides. We thank the authors for submission of their research works for publication in this journal. We are grateful to the reviewers of all the articles in this special issue for providing professional evaluation of the manuscripts in a timely manner. Finally, we appreciate the commitment of the Editor of the *International Journal of Engineering, Science and Technology* in helping us to put together this piece of scholarly work.

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