Synthesis and Characterisation of Fe_2O_3 as a base material for rare earth metals doping by Co-Precipitation route

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Abstract

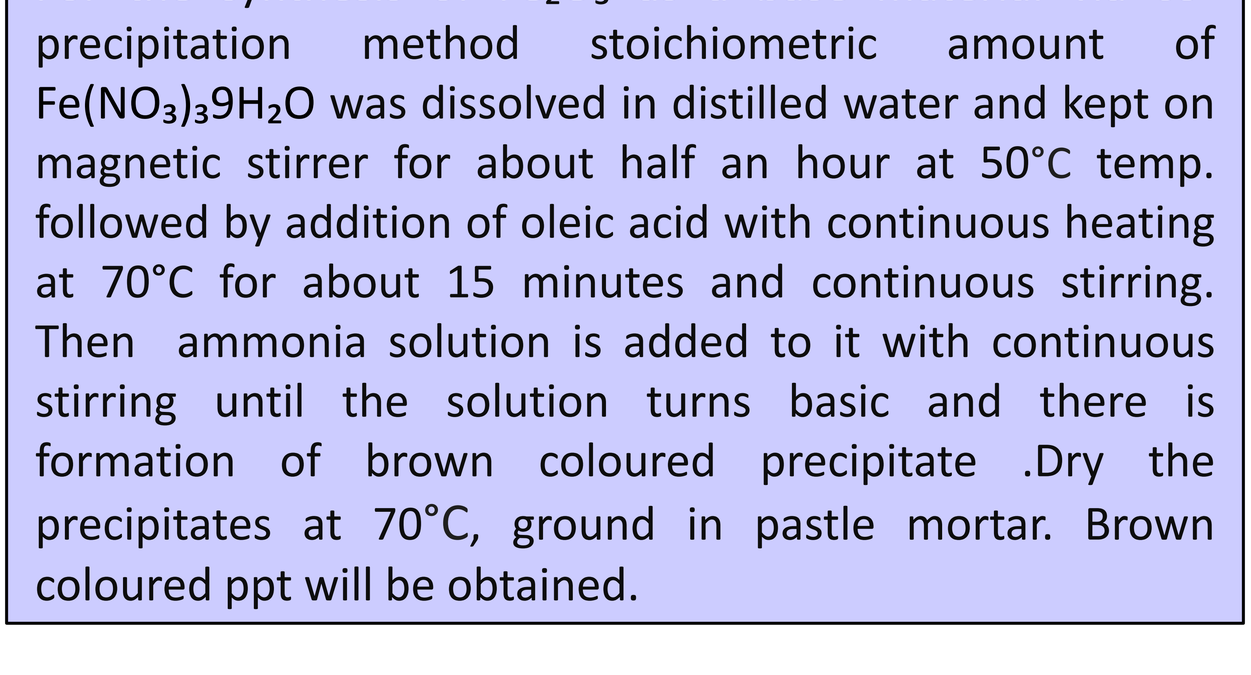
α-Fe_2O_3 nanoparticles were prepared via co-precipitation method using Ferric Nitrate ($Fe(NO_3)_3 \cdot 9H_2O$) as a precursor. These exhibit many unique properties such as electrical, chemical, optical and magnetic properties which are advantageous towards a variety of the applications. They are considered to be important materials due to their catalytic activity, biocompatibility, low-cost, nontoxicity and environmentally friendly nature.

Introduction

Aiming towards synthesis of rare earth-doped transition metal oxide composites for their gas sensing application first step is the synthesis of Fe_2O_3 as a base material via co-precipitation route and its characterisation using XRD. This will be appropriate in the doping of rare earth metals to find applications across various sensing domains, including gas sensors and humidity sensors.

Synthesis Method

For the synthesis of Fe_2O_3 as a base material via co-precipitation method stoichiometric amount of $Fe(NO_3)_3 9H_2O$ was dissolved in distilled water and kept on magnetic stirrer for about half an hour at 50°C temp. followed by addition of oleic acid with continuous heating at 70°C for about 15 minutes and continuous stirring. Then ammonia solution is added to it with continuous stirring until the solution turns basic and there is formation of brown coloured precipitate .Dry the precipitates at 70°C, ground in pastle mortar. Brown coloured ppt will be obtained.

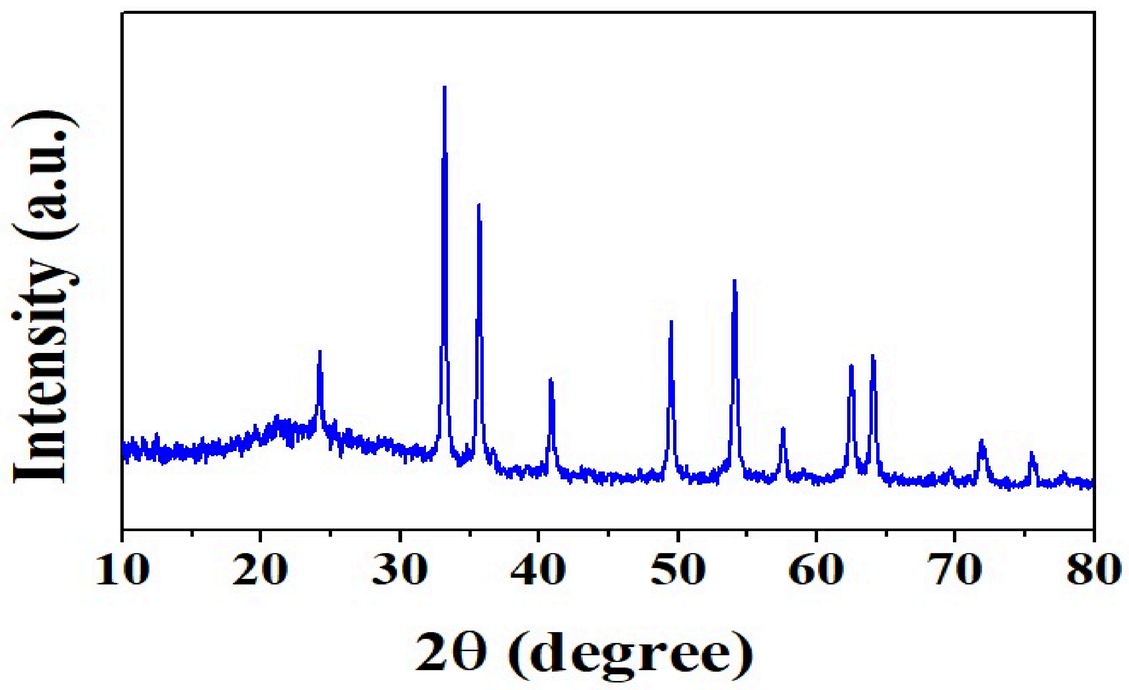


Synthesis of Fe_2O_3 as a Base Material via Co-precipitation method

Set-Up

Sample images during synthesis

Result



XRD Pattern of Fe_2O_3

Conclusion

Base material Fe_2O_3 was successfully synthesised using co-precipitation method.

XRD analysis shows absence of any extra phase in the precipitates making it suitable for the doping of rare earth elements for the formation of composites.

References

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