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Fabrication and Characterization of Ce modified SmFeO₃ thick film**R.B.Mankar^{*a}, V.D.Kapse^b**^{*a} Department of Physics, Smt. Radhabai Sarada Arts, Commerce and Science College, Anjangaon Surji 444705, Maharashtra State, India^b Department of Physics, Arts, Science and Commerce College, Chikhaldara 444807, Maharashtra State, India**Abstract**

Thick films of SmFeO₃ were prepared onto a glass substrate by screen printing technique and fired at 500°C for 30 min. As-prepared pure SmFeO₃ thick films were then dipped into 0.1 M aqueous solution of Cerium Chloride for 5 min. The films were then fired at 550 °C for 30 min to obtain Ce modified SmFeO₃ thick films. Structural and morphological properties of both pure and surface modified SmFeO₃ thick films were characterized by Field Effect Scanning Electron Microscopy (FE-SEM) and Energy Dispersive X-Ray Analysis (EDAX) techniques. The effect of cerium doping on microstructure and surface morphology of pure SmFeO₃ thick film was discussed.

Keywords: SmFeO₃, Surface modification, Perovskite, Gas sensor.

Introduction

Presently, environmental pollution due to hazardous gases emitting from auto and industrial exhaust has become a big challenge for human being. Therefore, detection and monitoring these gases is strongly required for better air quality. Different techniques have been employed for environmental monitoring. Among them metal oxide based gas sensors are of practical interest due to their small size. In 1962, Seiyama et al reported first semiconductor metal oxide gas sensor and since then different semiconducting metal oxides have been studied for ethanol, benzene, NO₂ and VOCs [1-3]. But, their gas sensing characteristics such as sensitivity, selectivity, stability and operating temperature are still unsatisfactory.

Over a past few decade, perovskites of type ABO₃ (A: rare earth, B: transition metal) have attracted a great deal of attention for gas sensor due to their improved physical and chemical properties. Due to its doping flexibility, adsorption and desorption behavior can be controlled and sensor performance can be optimized. Properties of perovskite such as ionic and electronic conductivity, chemical stability and reactivity depends on the nature and amount of A and B cations. These properties can be tuned for particular application by partial substitutions at A-site, B-site and/or both A-site and B-site. Therefore perovskites have extensively studied for wide range of applications including solid oxide fuel cell [4], catalysis [5] and gas sensors [6-7]. Among various perovskite oxides, SmFeO₃ is reported to be a promising material for gas sensor due to its stability in thermal and chemical atmosphere. SmFeO₃ is one of the rare earth orthoferrite-type semiconducting material [8]. It is extensively used in gas sensor for oxidizing gases like O₃, NO₂, ethanol. However, its use for reducing gases, like CO and H₂ is limited because of its lower reduction stability and electrical conductivity [9-10]. Both reduction stability and electrical conductivity depends on nature of A and B cations. ABO₃ type perovskite structure of SmFeO₃ permits the modification in microstructure by partial substitution at A-site and/or the B-site. Literature survey showed that doping of A-site with bigger cation enhances reduction stability whereas doping at B-site affects electrical conductivity as well as thermal stability. Researchers have reported the advantages of introducing Ce at A-site and Co, Ni and Mg at B-site [11-12]. S.M. Bukhari et al have reported that the partial substitution of Sm by Ce within the solubility limit improves the electrical conductivity of perovskite as well as prevents it from decomposing under reducing conditions [13]. This creates the possibility of using Ce doped SmFeO₃ as a gas sensor for reducing gases.

For the synthesis of SmFeO₃ perovskite different methods like sol-gel method [14] and hydrothermal method [15] have been adopted. Sol-gel method in citric system has advantage of providing SmFeO₃ perovskite powder with high sensitivity and selectivity.

In our previous work, we reported the synthesis of pure SmFeO₃ perovskite powder by Sol-gel method. In the present work, surface modification in SmFeO₃ thick films prepared by screen printing method was achieved by dipping technique.

Methods And Material**2.1. Preparation of SmFeO₃ powder**

Stoichiometric amounts of samarium nitrate Sm(NO₃)₃·6H₂O, iron nitrate Fe(NO₃)₃·9H₂O and citric acid monohydrate were mixed in the ratio 1:1:1. The mixture was grounded in Agate mortar for 30 minutes. Ethylene glycol was added to this mixture under constant stirring at 75°C for 2 hours to obtain a sole which was then dried into a gel. The gel was dried in oven at 110°C for 12 hours and allowed to cool naturally. Finally, sample was calcined at 800°C for 4 hours.

2.2. Preparation of SmFeO_3 thick films

The thixotropic paste was formulated by mixing the fine powder of SmFeO_3 with the solution of ethyl cellulose in a mixture of organic solvent. The ratio of inorganic to organic part was 75:25. This paste was then screen-printed on glass substrate in desired pattern. The films were fired at 500°C for 30 min. and termed as pure SmFeO_3 thick film.

2.3. Preparation of Ce surface modified thick films

As-prepared pure SmFeO_3 thick films were dipped into 0.1 M aqueous solution of cerium chloride for 5 min. After drying, these films were fired at 550°C for 30 min and termed as Ce surface modified SmFeO_3 thick film.

Results And Discussion

3.1. X-ray diffraction and surface morphology analysis of pure SmFeO_3 powder

X-ray diffraction pattern of synthesized pure SmFeO_3 powder was reported in our previous paper [16]. The crystallite size was estimated to be 50.08 nm.

3.2. Surface morphology of pure and modified SmFeO_3 thick films by FESEM analysis

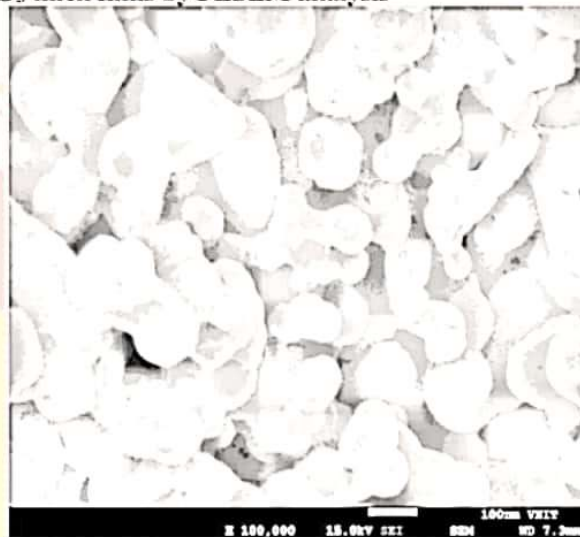
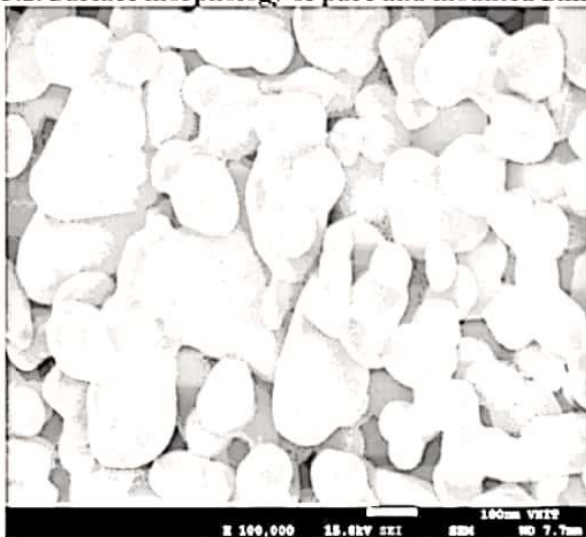


Fig. 1: FESEM of pure SmFeO_3 thick film.

Fig. 2: FESEM of Ce doped SmFeO_3 thick film.

Fig. 1 represents the FESEM images of pure SmFeO_3 thick film fired at 500°C for 30 min. The micrograph shows the presence of large number of grains with grain size ranging from 53 nm to 131 nm on the film. The films were highly porous with inner layer of perovskite type oxide adhere to the substrate. Due to the firing temperature, sintering proceeded and growth of the grains was observed. The composition of organic vehicle also influences the morphology of film. The presence of α -terpineol favored the sintering of grains. Fig. 2 depicts FESEM image of Ce doped SmFeO_3 thick film for dipping time interval 5 min and fired at 550°C for 30 min. The micrograph shows the distribution of smaller particles around the larger grains. The smaller particles may be attributed as Ce species. The modified thick film appears to have comparatively high porosity and large surface area for oxygen adsorption.

3.3. Elemental composition of pure and modified SmFeO_3 thick films by EDS analysis

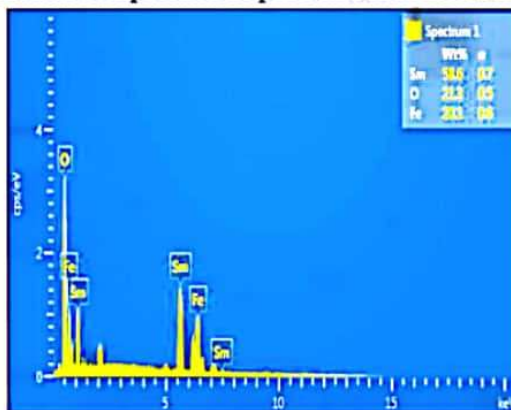


Fig 3: EDS of pure SmFeO_3 thick film.

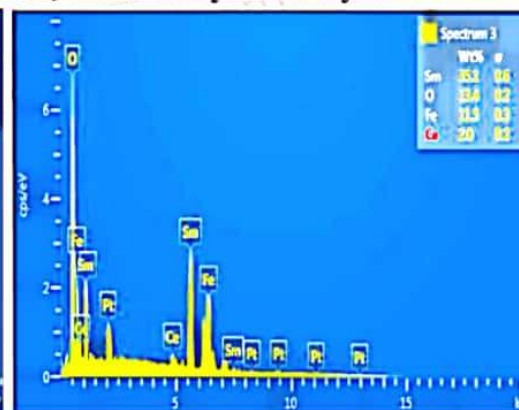


Fig 4: EDS of Ce doped SmFeO_3 thick film.

Elemental analysis of pure and Ce doped thick films was carried out by EDS technique. Table 1 represents the wt % of constituent elements of both pure and modified films.

Table 1: Quantitative elemental analysis.

| | Pure SmFeO ₃ thick film | Ce modified SmFeO ₃ thick film |
|-----------|------------------------------------|---|
| Sm (wt.%) | 58.6 | 35.1 |
| O (wt.%) | 21.3 | 13.4 |
| Fe (wt.%) | 20.1 | 11.5 |
| Ce (wt.%) | --- | 2.0 |
| Total | 100 | 100 |

It is observed from table 1 that weight percentage of oxygen decreases due to Ce doping. Further it was observed that both the samples are oxygen deficient but oxygen deficiency is more in Ce doped thick film than pure SmFeO₃ thick film. Therefore, Ce doped SmFeO₃ thick film may facilitate increased oxygen adsorption.

Conclusions

The results demonstrated that surface modification of SmFeO₃ thick films can be achieved by dipping technique. Moreover Surface modification promotes increased oxygen adsorption. FESEM analysis and EDX analysis respectively confirm the structural morphology and the elemental composition of both pure and modified thick films.

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References

1. S. Vanalakar, V. L. Patil, S. M. Patil, S. B. Dhavale, T. D. Dongale, and P. S. Patil, "Recent progress in Nanostructured Metal Oxides based NO₂ gas sensing in India," *J. Mater. Nanosci.*, vol. 9, no. 1, pp. 13–25, 2022.
2. S. Bangale and S. Bamane, "Green synthesis of CdFe₂O₄ nanoparticles and their application for ethanol vapour sensing," *Carbon-Sci Technol*, vol. 5, pp. 231–235, 2013.
3. M. Salavati-Niasari, F. Davar, and M. Farhadi, "Synthesis and characterization of spinel-type CuAl₂O₄ nanocrystalline by modified sol-gel method," *J. Sol-Gel Sci. Technol.*, vol. 51, no. 1, pp. 48–52, 2009.
4. S. K. Rout and S. K. Pratihari, "Tailoring of properties in the preparation level of nano crystalline Ce_{0.8}Sm_{0.2}O_{1.9-δ} (SDC) for the use of SOFC electrolyte," *Mater. Today Proc.*, vol. 45, pp. 5764–5768, 2021.
5. K. Wang, C. Han, Z. Shao, J. Qiu, S. Wang, and S. Liu, "Perovskite oxide catalysts for advanced oxidation reactions," *Adv. Funct. Mater.*, vol. 31, no. 30, p. 2102089, 2021.
6. W. Qin, Z. Yuan, H. Gao, R. Zhang, and F. Meng, "Perovskite-structured LaCoO₃ modified ZnO gas sensor and investigation on its gas sensing mechanism by first principle," *Sens. Actuators B Chem.*, vol. 341, p. 130015, 2021.
7. T. Liu et al., "Ethanol sensor using gadolinia-doped ceria solid electrolyte and double perovskite structure sensing material," *Sens. Actuators B Chem.*, vol. 349, p. 130771, 2021.
8. S. M. Bukhari and J. B. Giorgi, "Effect of cobalt substitution on thermal stability and electrical conductivity of Sm_{0.95}Ce_{0.05}FeO_{3-δ} in oxidizing and reducing conditions," *Solid State Ion.*, vol. 181, no. 8–10, pp. 392–401, 2010.
9. M. Zhao, H. Peng, J. Hu, and Z. Han, "Effect of cobalt doping on the microstructure, electrical and ethanol-sensing properties of SmFe_{1-x}CoxO₃," *Sens. Actuators B Chem.*, vol. 129, no. 2, pp. 953–957, 2008.
10. Y. Hosoya, Y. Itagaki, H. Aono, and Y. Sadaoka, "Ozone detection in air using SmFeO₃ gas sensor," *Sens. Actuators B Chem.*, vol. 108, no. 1–2, pp. 198–201, 2005.
11. L. Chen et al., "Ethanol-sensing properties of SmFe_{1-x}NixO₃ perovskite oxides," *Sens. Actuators B Chem.*, vol. 139, no. 2, pp. 407–410, 2009.
12. Y. Itagaki, M. Mori, Y. Hosoya, H. Aono, and Y. Sadaoka, "O₃ and NO₂ sensing properties of SmFe_{1-x}CoxO₃ perovskite oxides," *Sens. Actuators B Chem.*, vol. 122, no. 1, pp. 315–320, 2007.
13. S. M. Bukhari and J. B. Giorgi, "Tuneability of Sm (1-x) CexFeO₃ perovskites: Thermal stability and electrical conductivity," *Solid State Ion.*, vol. 180, no. 2–3, pp. 198–204, 2009.
14. C. R. Michel, E. Delgado, G. Santillán, A. H. Martínez, and A. Chávez-Chávez, "An alternative gas sensor material: synthesis and electrical characterization of SmCoO₃," *Mater. Res. Bull.*, vol. 42, no. 1, pp. 84–93, 2007.
15. M. C. Carotta, G. Martinelli, Y. Sadaoka, P. Nunziante, and E. Traversa, "Gas-sensitive electrical properties of perovskite-type SmFeO₃ thick films," *Sens. Actuators B Chem.*, vol. 48, no. 1–3, pp. 270–276, 1998.
16. R. B. Mankar, V. D. Kapse, "Synthesis of SmFeO₃ perovskite oxide by Sol-gel method," *International Journal of Current Engineering and Scientific Research.*, vol. 5, no 1 pp. 324-326 2018.