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THE EFFECTS OF ZnO ADDITION ON THE PROPERTIES OF Y^{3+} DOPED BaZrO3 PREPARED BY PECHINI METHOD

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ABSTRACT

A $BaZr_{0.95}Zn_{0.05}Y_{0.1}O_3$-α (BZY10) sample was successfully prepared by Pechini method (PM) using metal nitrate-salts. The properties of the synthesized powder were determined using X-ray diffraction (XRD), scanning electron microscope (SEM), particles size analyzer and Fourier transform infrared (FTIR) Spectroscopy. FTIR analysis showed that decomposition of powder almost completed at 1100 ºC. Single phase of $BaZrO_3$ was observed after calcination at *T*= 1300 ºC which is 200 ºC lower than that prepared by conventional solid state reaction (SSR) method. The loose particles size obtained from SEM and particle size analyzer was in the range 30−80 nm. The conductivity of the sample was 6.9 × 10-4 S cm-1 at *T*= 700 ºC in wet-nitrogen and the total activation energy, *EaT* was 0.79 eV.

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REFERENCES

[1]. K.H. Ryu and S.M. Haile (1999). Chemical stability and proton conductivity of doped BaCeO4−BaZrO3 solid solutions. Solid State Ionics. 125,355−367.
[2]. H. Iwahara, T. Esaka, H. Uchida and N. Maeda (1981). Proton Conduction in sintered oxides and its application to steam electrolysis for hidrogen production. Solid State Ionics 3&4, 359-363.
[3]. H. Iwahara, T. Yajima, T. Hibino, K. Ozaki and H. Suzuki (1993). Protonic conduction in calcium, strontium and barium zirconates. Solid State Ionic 61, 65
[4]. A.M. Azad, S. Subramaniam and T.W. Dung (2002). On development of high density barium metazirconate (BaZrO3) ceramics. J. Alloy Compds. 334, 118−130.
[5]. H.G. Bohn and T. Schober (2002). Electrical conductivity of the hightemperature proton conductor BaZr0.9Y0.1O2.95. Solid State Ionics. 83, 768−722.
[6]. S.M. Haile and P. Babilo (2005). Enhanced sintering of yttrium-doped barium zirconate by addition of ZnO. Journal American Ceramic Society 88, 2362−2368.
[7]. A.M. Azad and N.C. Hon (1998). Characterization of BaSnO3 based ceramic Part 1: synthesis, processing, and microstructural development. J. Alloys Comp. 270, 95−106.
[8]. A.M. Azad, L.L.W. Shyan and P.T. Yen (1999). Synthesis, processing and microstructural characterization of CaSnO3 and SrSnO3 ceramics. J. Alloys Comp. 282, 109−124.
[9]. A.M. Azad and S. Subramaniam (2002). Synthesis of BaZrO3 by a solid-state reaction technique using nitrate precusors. Materials Research Bulletin 37, 85−97.
[10]. S.N.A. Bakar, I.A. Talib, N. Osman (2008). Pencirian BaZrO3 terdop Y3+

dengan zink sebagai aditif yang disediakan melalui kaedah pechini. Prosiding kolokium siswazah ke-8. Pages 118−120. Fakulti Sains dan Teknologi, UKM, Bangi. Julai 2008.
[11]. F. Boschini, B. Robertz, A. Rulmont and R. Cloots (2003). Preparation of nanosized barium zirconate powder by thermal decomposition of urea in an aqueous solution containing barium and zirconium, and by calcination of the precipatate. Journal European Ceramics Society. 23, 3035−3042.
[12]. G. Taglieri, M. Tersigni, P.L. Villa and C. Mondelli (1999). Syntesis bu citrate route and characterization of BaZrO3, a high tech ceramic results. International Journal of Inorganic Materials. 1, 103−110.
[13]. K. D. Kreuer, S. Adams, W. Munch, A. Fuchs, U. Klock and J. Maeir (2001). Proton conducting alkaline earth zirconates and titanes for high drain electrochemical applications. Solid State Ionics. 145, 295−306.
[14]. N. Osman, I.A. Talib and H.A. Hamid (2008). Properties of sol-gel prepared BaCeO3 solid electrolyte using acetate precursors. *Ionics*. DOI 10.1007/s11581-008-0258-4.