

Study of stainless steel type 444 at high temperatures for SOFC applications

C. R. C. Sousa^{(1) *}, W. Acchar⁽¹⁾, H. R. Paes Jr.⁽²⁾, E. D. V. Silva⁽²⁾, E. Feistauer⁽³⁾ and L. S. Barreto⁽⁴⁾

(1) Pos-graduation Program of Science and Materials Engineering-UFRN, Natal-RN, Brazil, CEP: 59072-970 * Corresponding author: clawsiocruz@gmail.com

(2) LAMAV, North Fluminense State University, Campos dos Goytacazes-RJ, Brazil, CEP: 28013-602 e-mail: herval@uenf.br

(3) Center of Graduate in Science and Engineering -UFS, Sergipe -SE, Brazil, CEP: 49000-100 e-mail: efeistauer@hotmail.com

(4) Pos-graduation Program of Science and Materials Engineering-UFS, Sergipe-SE, Brazil, CEP: 49000-100 e-mail: ledjane.ufs@gmail.com

Abstract:

Solid oxide fuel cells operated at intermediate temperature makes possible the use of metallic interconnects in substitution to the LaCrO_3 . The metallic material has as advantage the low cost when compared to the ceramic material [1-4]. The metallic substrates were covered with ceramic films deposited by spray-pyrolysis. It was used stainless steel type 444. Flexural mechanical tests at four-point were made at room and high temperatures. They were also made the oxidation behavior and chemical integrity at high temperatures. Figure 1 shows the mechanical behavior of the stainless steel and a reduction of strength can be observed in high temperatures. Figure 2 shows the oxidation behavior and could be observed an increase of weight of the metallic substrates for temperatures higher than 850 °C.

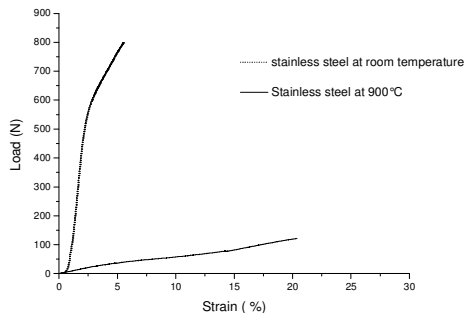


Figure 1: Strength tests at room temperature and high temperatures of stainless steel 444.

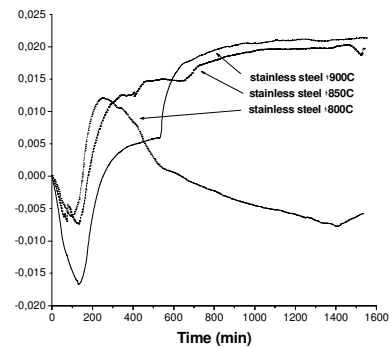


Figure 2: Oxidation behavior of the stainless steel 444.

References

- [1] Zhu, J. H., Zhang, Y., Basu, A., Paranthaman, M., Lu, Z.G., Lee, D.F., Payzant, E.A., *Surface and Coatings Technology*, 177-178 (2004) pp. 65-72.
- [2] Jiang, S. P., Liu, L., Ong, K. P., Wu, P., Li, J., Pu, J., *Journal of Power Sources*, 176 (2008), pp.82-89.
- [3] Fergus, J. W., *Solid State Ionics*, 171 (2004) pp.1-15.
- [4] Brylewski, T., Przybylski, K., Morgiel, J., *Materials Chemistry and Physics*, 81 (2003), pp. 434-437.
- [5] Jiang, Y., Gao, J., Liu, M., Wang, Y., Meng, G., *Materials Letters*, 61 (2007) pp.1908-1911.