공소결에 의한 이트리아 첨가 지르코니아와 칼슘 첨가 란타늄 크로마이트의 접합
Bonding of Yttria-Stabilized Zirconia and Calcium-Doped Lanthanum Chromite by Co-firing

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1. Introduction

The bonding of one ceramic body to another is important for the development of devices with complex shapes and functions Particularly, bonding of the ceramic and metal/ceramic parts in solid oxide fuel cell stack to give strong gas tight seal is necessary for satisfactory operation While bonding methods based on brazing, glass or diffusion process may be suitable for some cell components, it is considered that green state co-firing bonds can meet the operating temperature requirements of 1173-1273 K. In this work it is investigated that some of the factors involved in co-firing yttria-stabilized zirconia (YSZ) and calcium-doped lanthanum chromite (CaLC)

2. Experimental

CaLC was prepared by the oxalic salt method The solutions of Metal nitrates were co-precipitated, dried and then calcined at 1273 K for 10 h in air Resulting powders were almost of a single phase, as measured by XRD. Powder compacts of YSZ (TOSOH-TZ8YS) and CaLC were pressed into pellets (23 mm in diameter) at 30 MPa using a starch binder The co-firing was carried out to find the suitable conditions of temperature, duration time and applied pressure for bonding YSZ and CaLC After co-firing under various conditions, the bodies were cut perpendicular to the surface and then subjected to SEM observation The reaction products and the composition in the junction phases were analyzed automatically with an EDX. In addition, the reaction products in the junction phases were examined by a XRD

3. Results and discussion

The bonding experiments between YSZ and CaLC were attempted by multi-step co-firing in the temperature range from 1473 K to 1673 K. As YSZ easily reacted with the CaLC to form $CaZrO_3$, good bonding was accomplished by the formation of thick $CaZrO_3$ layers at the interface This has significance with respect to the electrical behavior of the interface and it reveals that there are problems of the deterioration of YSZ and difficulties in sintering CaLC due to the diffusion of Ca from CaLC to YSZ To solve the problems, the following measures might be considered (1) coating the surfaces by an inactive substance, (2) making a new CaLC inactive to the SOFC components by changing the composition

4. Conclusions

Co-firing can be used to join YSZ and CaLC Co-firing facilitates the formation of a junction phase, which involves considerable transport of major components of the system. Changing the level of calcium doping in the lanthanum chromite can modify the composition and thickness of junction phase

5. References

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