



グローバル COE 物質科学イノベーション講演会

演 題 : Alumina (Al_2O_3) Additions to Conducting Zirconia (ZrO_2) Ceramics – A Modern Perspective

講 師 : **Prof. John Drennan**

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日 時 : 2008 年 3 月 6 日 (木) 16:30 ~ 17:45

場 所 : 理学部本館 N308 号室

共 催 : 日本化学会北海道支部

要 旨 :

More than thirty years (1) ago it was recognized that addition of aluminium oxide to stabilized zirconia ceramics had beneficial effects. Sintering appeared to be improved and in some early reports this was accompanied by improvements in the conducting properties. Since this time there has been a continuous stream of articles reporting the various aspects of this effect with the majority of reports supporting the fact that alumina additions are beneficial. Commercially, electrolyte materials used in fuel cell applications contain small deliberate additions of alumina and in some fuel cell designs, the addition of alumina is key to producing thin electrolytes with mechanical stability. The mechanism by which alumina improves the properties is still in contention, however, a recent set of experiments, that will be described in this presentation, provides insight into the mechanism by which alumina interacts.

However, there is also appearing, a negative aspect to the addition of alumina which has begun to show up in systems that have been operating for long periods of time. Long term experiments on fuel cell systems which contain alumina additions to the zirconia based electrolyte show that interactions can take place that are detrimental to the performance of the cell. These new results will be presented which show that solid state interactions at both the anode and cathode interface can lead to disruption of the cell and in any new design, these effects must be controlled.

- (1) Radford, K.C. and R.J. Bratton, *Zirconia Electrolyte Cells .2. Electrical-Properties*. Journal of Materials Science, 1979. 14(1): p. 66-69.

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