

卓越した大学院拠点形成支援補助金
「流動ダイナミクス知の融合教育研究世界拠点」
平成 25 年度 博士課程後期学生（国際）会議派遣 参加報告書

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学会名 Conference's name	38 th International Conference and Exposition on Advanced Ceramics and Composites
開催地 Venue (Name of the facility, city & country)	Hotel Hilton Daytona Beach Resort, Daytona Beach, Florida, United States of America
日程 Conference period	27 th January – 31 st January 2014
発表タイトル Presentation Title	Enhancement of Electrochemical Performance on $\text{LaNi}_{0.6}\text{Fe}_{0.4}\text{O}_{3-\delta}$ Film Electrode Modified by $\text{Ce}_{0.9}\text{Gd}_{0.1}\text{O}_{1.95}$ Particles
<p>【発表概要 Brief summary of your presentation】</p> <p>Mixed conducting $\text{LaNi}_{0.6}\text{Fe}_{0.4}\text{O}_{3-\delta}$ (LNF) electrode was combined with an ionically conducting oxide $\text{Ce}_{0.9}\text{Gd}_{0.1}\text{O}_{1.95}$ (GDC) resulting high area specific conductivity (ASC). The electrochemical performance of LNF is enhanced with mixing GDC might be not only due to the extension of triple phase boundary since LNF itself has sufficient ionic conductivity to reduce the oxygen at some portion of the electrode surface. Using dense film electrode which prepared by pulsed laser deposition to simplify the reaction pathway we examined the enhancement factor on area specific conductivity. The surface of the LNF film electrode has been coated with GDC particles, and the electrochemical performance is compared with the bare LNF film electrode under the same condition of sample preparation and measurement to determine the effect of the GDC porous layer. The LNF film electrode coated with GDC porous layer on the top showed higher ASC compared to the bare LNF film electrode. In this case, besides the extension of triple phase boundary, the catalytic activity itself could also be enhanced at the junction of the two oxides. The enhancement of ASC will be also proved by measuring its oxygen surface exchange kinetics by secondary ion mass spectrometry (SIMS). The reason why enhancement on surface exchange kinetic of LNF film – GDC porous still unresolved. The analysis on compositional change of LNF film – GDC porous has been done by Auger Electron Spectroscopy. It showed that in the interface of LNF film – GDC porous, Ce might be replacing some La in the LaNiFeO_3 structure. Within Ce inclusion into La, it will increase the surface exchange kinetics. However, this result needs to be clarified.</p>	

【他の講演等から得られた知見、感想等。What you learned from other presentations, general impression you had, etc.】

For around a week, I watch many presentations on this conference. I joined solid oxide fuel cell focus meeting which was related to my research topics. Several presentation really was interesting, especially on the composite topics. In their presentation, they claim that composite is the future on the electrode SOFC because it has high electrochemical performance compared to single phase electrode. Even we understand there is really high electrochemical performance; however the mechanism for enhancement hasn't been understood so far. It is big challenge for SOFC researcher to understand the mechanism for the enhancement of the composite electrode.

Another interesting topic is on infiltrated electrode. When we have single phase of the electrode, we covered it with some other material which is has high catalytic activity to reduce oxygen molecules. If we LaSrCoO_3 (LSC) which is high electronic and ionic conductivity then covered the LSC particles with Pr Oxide by infiltrating method, then Its electrochemical performance will increase several order. Although it is almost same with composite electrode system, however the approach to preparing the electrode is quite different. And its mechanism hasn't been understood.

This time in this conference, many researchers reported high electrochemical performance on composite-related electrode without explained the reason of the enhancement. It can be understood because this conference focuses on the material processing and system on solid oxide fuel cell. I had great experience on this conference. It was great discussion environment to enhance the SOFC research. Many researchers asked for the collaboration research and some of them invite me to come to their laboratory. I hope I have chance to come their laboratory to do some joint research.