

## Oxygen Reduction Kinetics on $\text{La}_{1-x}\text{Sr}_x\text{MnO}_{3+\delta}$ ( $x = 0.1 \sim 0.7$ )/YSZ for SOFC Systems

Hee Y. Lee, Woo S. Cho, and Seung M. Oh\*

*Department of Chemical Technology  
College of Engineering, Seoul National University*

Electrochemical  $\text{O}_2$  reduction kinetics were investigated with the perovskite manganites,  $\text{La}_{1-x}\text{Sr}_x\text{MnO}_{3+\delta}$  ( $x = 0.1 \sim 0.7$ ). The apparent transfer coefficient values in the Butler-Volmer equation for multi-electron process, which were obtained from the steady-state polarization curves and Tafel plots, indicated that the charge transfer step to atomically adsorbed oxygen is rate-limiting. The same conclusion was drawn with the  $\text{Po}_2$ -dependent AC impedance studies, where the exponent  $m$  in the relation of  $I_0$  (exchange current density)  $\propto \text{Po}_2^m$  was evaluated. The symmetry factors ( $\beta$ ) for the charge transfer step were dependent on the oxygen stoichiometry of the electrode materials; higher symmetry factors for more oxygen deficient samples. The oxygen stoichiometry ( $\delta$ ) at high temperatures was also varied depending on the Sr-doping contents. Among those samples ( $x = 0.1 \sim 0.7$ ), the manganite with  $x = 0.4$  showed the smallest value in the oxygen stoichiometry both at  $\text{Po}_2 = 0.21$  atm and  $7.7 \times 10^{-3}$  atm, with which sample the highest symmetry factor was observed.