Nonstoichiometric A-Site Deficient Nickelates as High Performance SOFC Cathodes

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One of the major challenges faced in solid oxide fuel cell (SOFC) research is to develop cathode materials with simultaneously high performance and stability. Our recent results showed that $Pr_{2-x}NiO_{4+\delta}$ series are promising candidates, which warrant further investigations with respect to structure-electrochemical property relationships.

In this poster, structural measurements were carried out by utilizing x-ray diffractometry on $Pr_{2-x}NiO_{4+\delta}$ series ($0 \leq x \leq 0.2$, in 0.05 increments) in atmosphere at room temperature. The electronic and ionic conductivity were measured as a function of pO_2 over a temperature range from 600 to 800 °C in O_2-N_2 atmospheres. Dense bar-shaped samples were used for conductivity measurements and the Hebb-Wagner blocking technique was utilized to measure ionic conductivity. The surface exchange coefficient (k) and diffusion coefficient (D*) will be reported for all values of x. Porous bars were used to improve the kinetics of the surface exchange process. Different particle size of $Pr_{2-x}NiO_{4+\delta}$ cathode materials was used and the cell performance was measured.