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Surface Modification of Anode as Electrolyte Reservoir for MCFC

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In order to enhance the wettability of anode under the appropriate electrolyte filling contents of cathode, we modified the surface characteristics of the conventional Ni-10wt.%Cr anode by means of the dip coating method using boehmite-sol. For the purpose of the good adhesion between boehmite and nickel surface, all coated anodes were also calcined at 450℃ for 4hr under the nitrogen condition, in which boehmite was changed to γ-phase alumina. However, the γ-phase alumina formed on Ni surface was reacted with molten carbonate eutectics (Li_2CO_3:K_2CO_3=62:38mol ratio) in process of pretreatment and formed γ-phase lithium aluminate.

The wettability of modified anode was confirmed by contact angle measurement. Moreover, no decrease of electro-conductivity was observed due to low coverage of alumina film on the surface of Ni anode. The surface modification made it possible to increase the amount of maximum electrolyte addition from 25-30 Vol.% to 50-60 Vol.% of anode pores. In addition, the anode modified with lithium aluminate from Al_2O_3-sol had an effect of preventing of sintering between Ni particles due to the pinning effect of the coating film. From the results, we can expect dual-function anode as one of breakthrough in the long time operation.