The In-situ of High Resolution X-ray Images of $LiFePO_4$/MCMB Electrodes under Various Conditions

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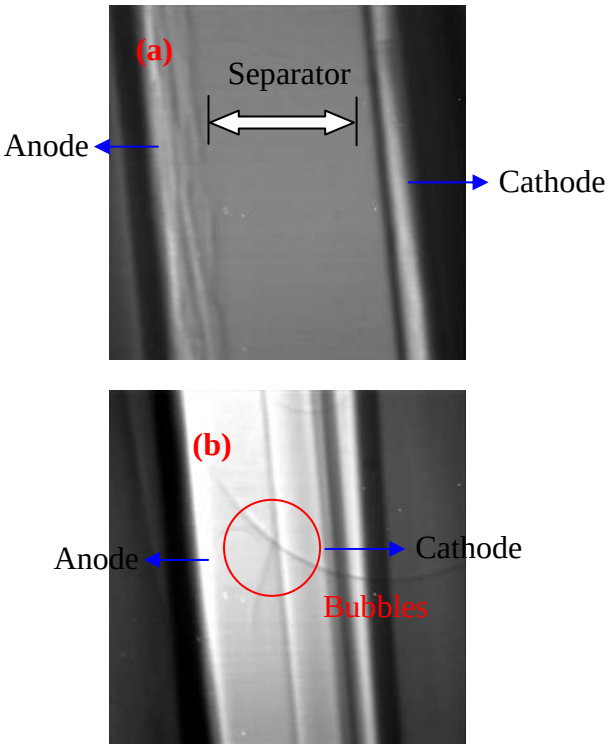
The $LiFePO_4$/Li cell exhibits a good cycle performance, whereas the $LiFePO_4$/MCMB cell suffers an unwilling fading at elevated temperatures. We have done a lot of efforts to figure out a fading mechanism of $LiFePO_4$/MCMB cells at temperature higher than 50°C by analyzing the cycled cathodes and anodes with SEM, EDS, micro-FTIR, and XPS. The amount of Fe dissolved increases with increasing amount of cathode moisture content, such that the Fe dissolution is suggested to be caused by the formation of the HF as the spinel $LiMn_2O_4$.

The X-ray images of $LiFePO_4$/ $LiPF_6$ in EC/DEC (v/v = 1/1)/ MCMB cell cycled with C/5 at room temperature with cathode containing 4.5×10^3 ppm water during the charging state was shown in Fig. 1. It shows the bubbles formed on anode as that had been reported by Gozdz. Et al.[1], whereas no bubbles are observed on the cathode. Furthermore, the formed rate of the bubbles on the anode increased with C-rate.

In Fig. 2 shows the X-ray image tests of the $LiFePO_4$/ $LiPF_6$ in EC/DEC (v/v = 1/1)/ MCMB cell cycled with C/3 at 55 °C including cathode containing 4.5×10^3 ppm water was shown. Bubbles are observed on anode during charged state.



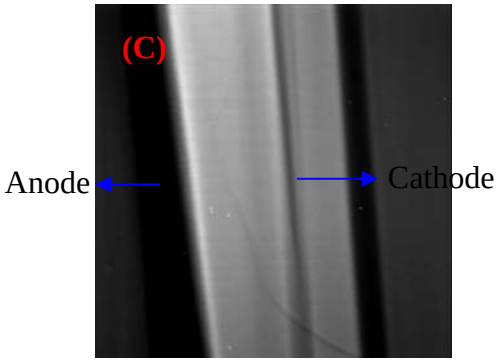


Fig. 1: The X-ray images of Li-ions cell comprised $LiFePO_4$ as cathode, MCMB as anode, and 1.0 *M* $LiPF_6$ in EC/DEC (v/v = 1/1) as electrolyte in (a) without processing (b) charge process (C) charge process at 30 °C.

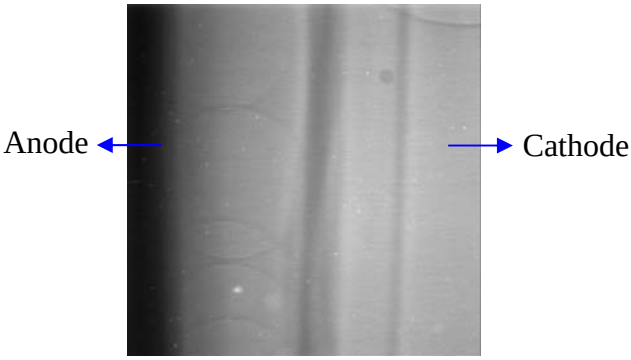


Fig. 2: The X-ray image of Li-ions cell comprised $LiFePO_4$ as cathode, MCMB as anode, and 1.0 *M* $LiPF_6$ in EC/DEC (v/v = 1/1) as electrolyte in a charge process at 55 °C.

Reference

[1] A. S. Gozdz and R. K. Jaworski, The Electrochemical Society Meeting Abstracts **96-1**, 52 (1996).