The study on the cell performances by the stacking structure of screen printed cathodes, electrolytes, and anodes

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The rapid progresses in the micro-electric industry and the miniaturization of electronic devices have prompted the development of all solid state lithium thin film batteries as self-contained power sources in such devices.

However, the applications of thin film batteries that have been reported so far appear to be limited by the small capacity and the polarization losses associated with the cell impedance. Thus, it is necessary to design two or three dimensional scale up of unit cells in series or parallel for further applications of thin film battery.

Consequently, We selected Screen Printing method to overcome the capacity shortage of thin film and to enhance easy patterning required for the integration of cells. Also, we investigated their electrochemical characteristics by the comparison of 2C structured cell [cathode/electrolyte/anode/electrolyte/cathode, Fig. 1 (c)] and 2A structured cell [anode/electrolyte/cathode/electrolyte/anode, Fig. 1 (b)], with conventional normal cell [cathode/electrolyte/anode, Fig. 1 (c)] as reference, with respect to cell capacity and internal resistance associated with cell impedance.

Screen Printed $LiMn_2O_4$, PEO-based polymer and Li/Cu foil are used for cathode, electrolyte and anode, respectively. Cu foil was current collector for Li anode.

As a result, 2C and 2A structured cells show improvements of cell capacity and fast response time, respectively. And both two different structured cells show improvement of polarization losses associated with the cell impedance.

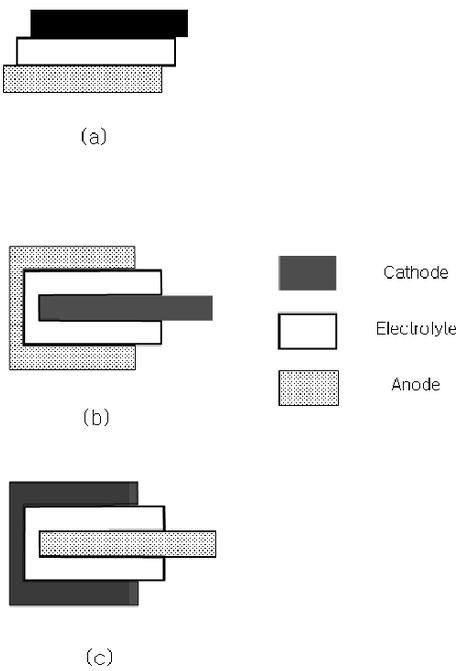

Figure 1. Schematic drawing of cell structures ; (a) Normal cell, (b) 2A structured cell and (c) 2C structured cell, respectively.