

Coulombic efficiency of graphite anode evaluated by ultra high precision charge and discharge system

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Precise control and measurement of charge/discharge current and capacity in cycle examination enable to obtain useful information about the side reaction, additive reaction, and degradation mechanism of LIB. For the purpose of this, we developed Ultra High Precision Charge and Discharge system (UHP C/D) as shown in Fig.1 [1][2]. In this presentation, we will focus on coulombic efficiency of graphite composite anode with different microstructure as an applicaion of UHP C/D.

Graphite composite anodes (92wt.% graphite and 8wt.% PVDF) with the different density and loading were made by usual method. Laminate half-cell was fabricated using composite anode and lithium metal. Electrolyte used is 1mol/dm^3 LiPF_6 EC/EMC (3:7 in vol.). Constant current charge/discharge cycle examination (current: $1/20\text{CA}$, voltage: 10mV - 1.5V) was done by UHP C/D at 23 degree. Current and voltage data were recorded at every 1 second.

As shown in Fig.2, coulombic efficiency of graphite composite anode was dependent on composite density and loading within 0.05% accuracy. Therefore, it is considered that difference of coulombic efficiency of graphite composite anode with different structure could be evaluated by our UHP C/D.

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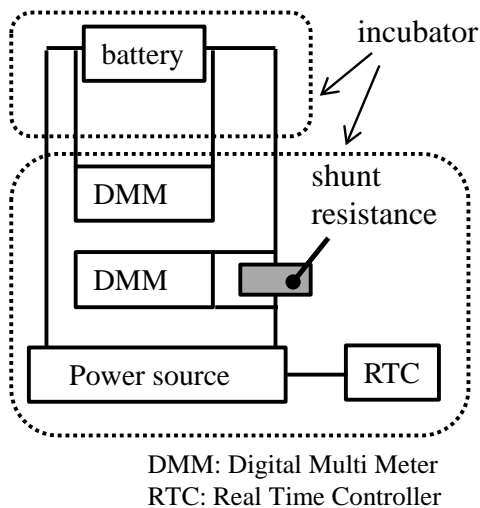


Fig.1 Diagram of UHP C/D.

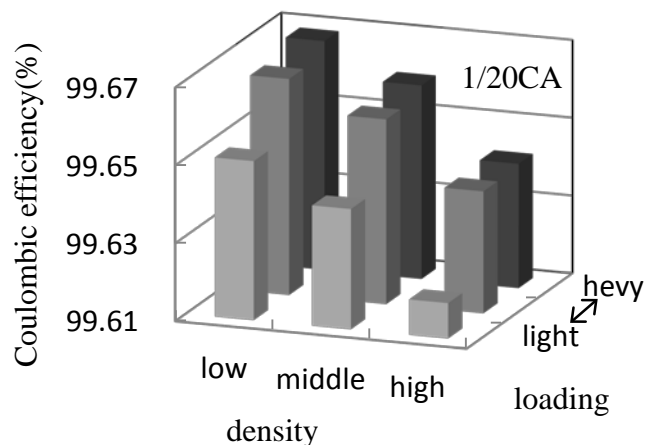


Fig.2 Coulombic efficiency dependence on composite density and loading.

References:

- [1] Yoshio Ukyo, et.al, The 56th Battery Symposium in Japan Abstract (2015), pp32
- [2] Yoshio Ukyo, et.al, The 84th ECSJ Spring Meeting Abstract (2017), 2N08