High Power Organic Radical Battery for Emergency Power Source

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Organic radical battery (ORB) has been attracted much interest as a new class of rechargeable battery with excellent high-rate charging-discharging properties. This technology was initially reported by us in 2001[1]. To date, we have succeeded in synthesizing a durable polyradical of 2,2,6,6 tetramethylpiperidine-4-yloxymethacrylate (PTMA) derivatives. Here we describe the preparation and properties of a high power ORB cells and their application to an emergency power source for IT equipments.

According to the method described in the previous paper [2], the 100 mAh-class film packed ORB cells (size: 50×43 mm, thickness: 4 mm) were fabricated with the durable PTMA. Figure 1 shows the discharge curves of series connected four ORB cells measured at various discharging currents. The fabricated cell is capable of discharging at surprisingly large current of 13 A (current rate 130C). Figure 2 shows the relationship between energy and power of the cells. This figure indicates that the ORB cells are possible to provide energy for 20 seconds at 100 W.

The ORB has been confirmed to be inflammable and non explosive. We have examined the use of the cells as an emergency power source for desktop type personal computer (PC, power consumption: 228 W maximum, 96 W average). Series connected four cells are connected to the power unit of the PC. When a power failure, blackout or voltage drop (20%) occurs, an off signal travels through the retention circuit, and the pulse generator starts the data backup process and shutdown of the computer. Figure 3 shows an example of the observed current and voltage changes of the ORB cells during the data backup process of PC. It is observed the continuous driving occurred during the entire data backup period.

The small sized ORB cells can be easily mounted in most desktop type PC and other IT equipments.

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References


Fig. 1 Discharge curves of ORB(series connected four cells, current: 1A to 13A)

Fig. 2 Plots of energy and power for series connected four ORB cells. The dashed lines indicate the seconds of power supply

Fig. 3 The observed current and voltage changes of the ORB cells during the data backup process of PC.