NEC Develops High-Power Organic Radical Battery for Data Backup during Power Failure

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NEC Corporation today announced that it is developing a high-power organic radical battery ("ORB") used to protect IT equipment such as desktop PCs from losing data during power supply interruption. The film packed ORB demonstrates a maximum power of 35-watt and its four series connected cells are capable of driving a 140-watt class desktop PC in the event of power supply interruption. This technology is extremely beneficial not only as an emergency power source for commercial computers and IT equipment, but also for a variety of equipment such as electrical household appliances.

ORB is a new class of rechargeable battery being uniquely developed by NEC, which uses the electrochemical reaction of organic radical compounds. This technology was initially proposed by NEC in 2001. To date, NEC has succeeded in synthesizing a polyradical of the modified PTMA, or "2,2,6,6-tetramethylpiperidinoxy-4-yl methacrylate," with excellent durability. Due to the high reactivity and reversibility of the radical reaction, the organic radical battery demonstrates extremely high power density and good cycleability making it suitable for a range of next generation applications.

The characteristics of this technology are as follows:

-- As a built-in ORB makes obsolete the need for energy conversions from AC to DC, or DC to AC, it realizes protection of equipment from

power failure with no loss of energy.

-- Environmentally friendly, the ORB consists of organic polymer which contains no harmful heavy metals, Hg, Pb, or Cd etc.

-- ORB has been confirmed to be inflammable and non-explosive, making it extremely safe.

On this occasion NEC demonstrated the use of the ORB as an emergency power source for NEC's typical desktop PC (power consumption: 228-watt maximum, 96-watt average) . In general, data backup of a PC takes several tens of seconds. Therefore, the battery only has to drive the PC for a short time during power failure to enable data backup. For example, 1.7 Wh* of energy is required to drive a 100-watt class PC for 60 seconds. However, cell capacity of 50Wh or more is the required power level (100 W) for conventional batteries such as Li-ion and Ni-MH cells. It is therefore considered uneconomical to use Li-ion or Ni-MH cells for PC data backup as larger sized batteries are very costly. On the contrary, a high-power ORB with a small capacity of 1Wh is capable of discharging 100 watts.

The four series connected cells are connected to the power unit of the desktop PC. When a power failure, blackout or voltage drop (of 20%) occurs, an off signal travels through the retention circuit, and the pulse generator starts the data backup process and shutdown of the computer. During this period, the ORB supplies power to the PC. The cells with a total weight of 88g can be easily mounted in most desktop PCs.

With the development of an IT society, it is expected that security for power failures will become increasingly essential. NEC believes that its built-in-type ORB will significantly contribute to achieving reliable information systems and is accordingly stepping up its research and development activities in this area, as well as its research into the ORB's

market potential.

This research was carried out as part of a project to develop a high-power density organic radical battery for data-backup supported by the New Energy and Industrial Technology Development Organization ("NEDO").