

A 200-Wh/kg laminate cell with high power and safety for industrial drones

Maiko Matsumura, Ryota Yanagisawa, Tatsuhiro Atsumi, Masaaki Matsuu, Hideaki Sasaki, Takayuki Suzuki, Tomoyuki Ohta, and Noriaki Oda
NEC Energy Devices, Ltd. 1120, Shimokuzawa, Chuo-ku, Sagami-hara, Kanagawa 252-5298, Japan
E-mail:m-matsumura@tg.jp.nec.com

A 10-Ah laminate-type lithium-ion cell with both of high-performance and safety was developed for use in a battery for industrial drones. The battery achieved a continuous discharge current of 60 A with a high energy density of 200 Wh/kg and showed excellent safety, causing no fire or smoke even in a drop test from a flight level as well as nail-penetration tests.

Drones are rapidly expanding in application, especially in industrial uses such as precision agriculture, transportation, and inspection of infrastructure facilities. Since the performance of drones greatly depends on the batteries employed, there is an increasing need for a quality battery with cost-effectiveness. High energy density (energy per unit mass), large discharge current, and safety of the battery significantly contributes to long flight time, fast response, and less danger of the drones.

To fulfill the above-mentioned requirements for the battery, we optimized cell design in terms of performance and safety. High Ni-concentration cathode and a heat-resistant separator were employed to increase energy density and thermal stability [1]. Low internal resistance was also ensured through the design for electrodes and electrolyte to increase output power.

Figure 1 shows a capacity retention characteristics of the 10-Ah laminate cell developed. High energy density of about 200 Wh/kg was achieved and retention rates of more than 90% were maintained up to 60 A of discharging current. Various safety tests were carried out, e.g., a drop test, nail-penetration tests, and the standard tests such as JIS C 8712 and UN transport. The results of these safety tests were sufficiently good, including the drop test for a battery package from 30-m height. We believe the 10-Ah cell developed has great potential for use in industrial drones.

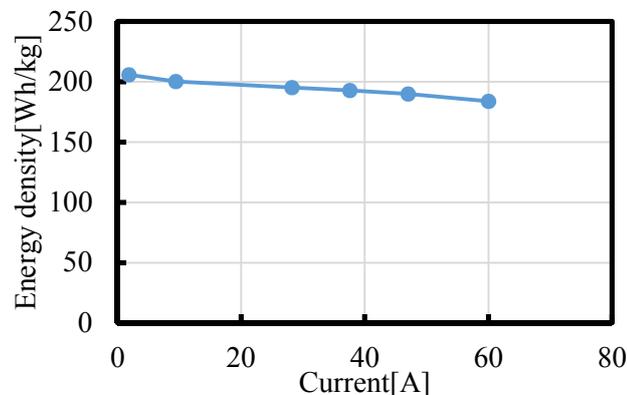


Fig. 1 Energy retention characteristics as a function of discharge current

References:

[1]Hideaki Sasaki et al., "60 Ah Laminate Cell with High Energy-Density of over 250 Wh/kg", IMLB2016, P1-0099 (2016)