Application Note B-TA2009

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TA2009 - TG-MS of anode active material for lithium-ion batteries

Introduction

Lithium-ion batteries are widely used as batteries for mobile applications such as notebook PCs and mobile phones, and are also applied to automobiles. In order for batteries to operate safely, it is important to understand the thermal stability of the constituent materials. Here, the thermal decomposition behavior of the anode active material was successfully investigated by TG-MS.

Analysis example

$LiCoO_2$ and $LiMn_2O_4$ standard materials were heated at 20°C/min from room temperature up to 1200°C in a He atmosphere. Electron ionization mode (EI) was used in MS. Figure 1 shows the TG-MS measurement results. The mass loss of $LiCoO_2$ was observed from around 1000°C, indicating the evolution of O_2 (m/z 32). In addition, CO_2 (m/z 44) derived from impurities was evolved around at 500°C. On the other hand, $LiMn_2O_4$ has a two-step mass loss at around 800°C and 1100°C, and O_2 was evolved in each step. Furthermore, the evolution of SO_2 (m/z 64) derived from impurities was confirmed around at 1000°C.

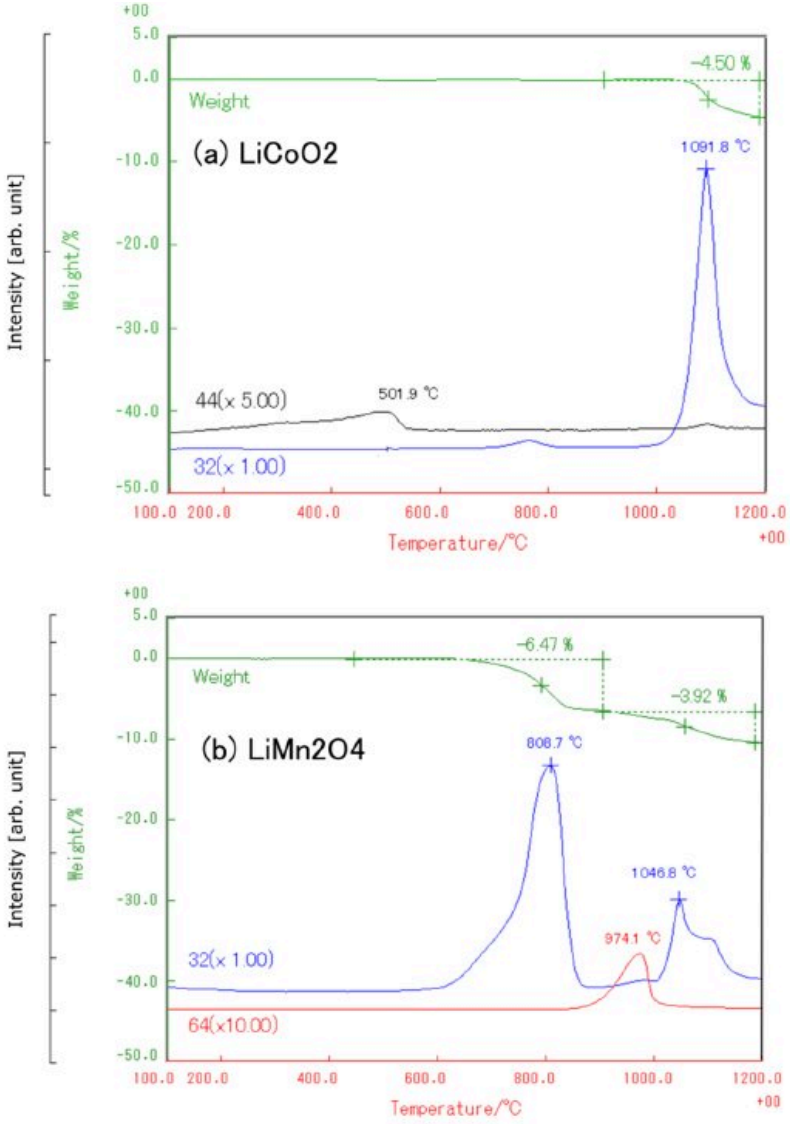
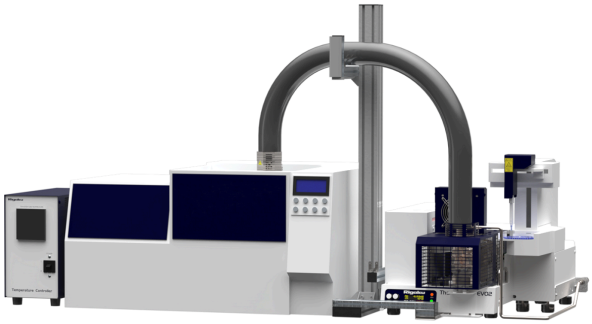


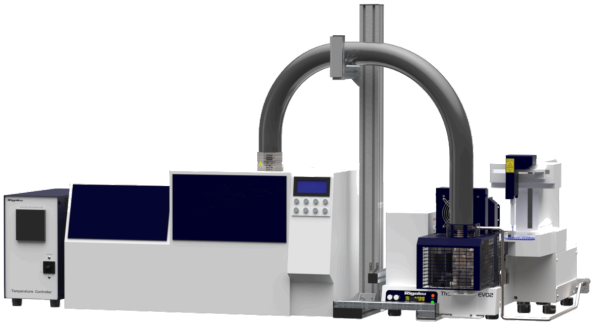
Figure 1: Thermal behaviors of TG and MS signals for (a) $LiCoO_2$ and (b) $LiMn_2O_4$. The numbers in parentheses are the magnification of the signal intensity in each ion.

Related products



STA/GC-MS

A thermal analysis device capable of highly sensitive simult aneous measurement of chemical reaction information that is difficult to determine with thermal analysis alone.



Sample observation STA/GC-MS

TG-GCMS measurements while observing the sample.