

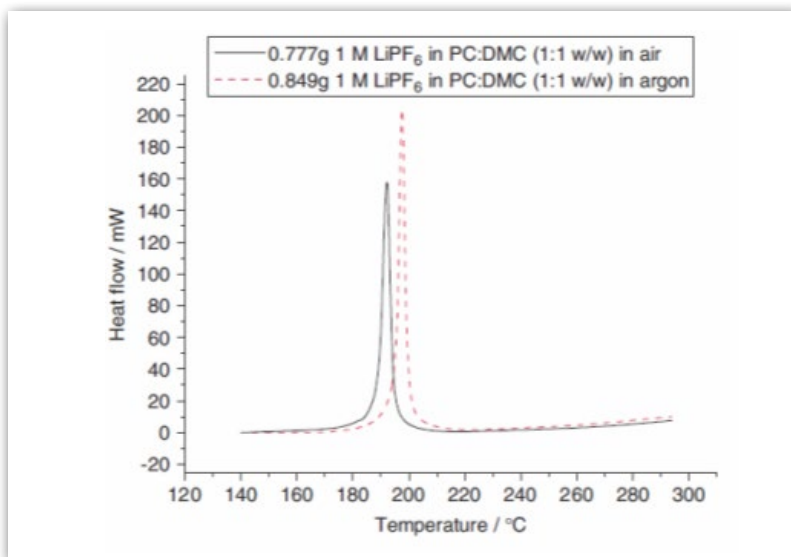
**Thermal stability of an electrolyte under temperature scanning conditions**

**INTRODUCTION**

When the temperature of a Li-ion battery increases because of abusive conditions (e.g., short circuit, overcharge, heating) self-heating may be initiated. Various exothermic and endothermic reactions involving both the solution and the electrodes can occur inside the battery. The CALVET calorimeter is used with high pressure stainless steel vessels to study the thermal stability of several commonly used organic solvents and electrolytes and to investigate the kinetic process of the related reactions.

**EXPERIMENTAL**

- Instrument: CALVET.
  - Vessel : High pressure stainless steel.
  - Sample : Electrolyte LiPF<sub>6</sub> in PC:DMC.
- Ethylene carbonate (EC), propylene carbonate (PC), dimethyl carbonate (DMC) and diethyl carbonate (DEC) are the most widely used solvents and LiPF<sub>6</sub> is the dominant solute used in practical lithium ion batteries.
- Method: Heating at 0.2°C/min to 300 °C in air or argon.



from Qingsong Wang and coll., *Journal of Loss Prevention in the Process Industries - 19 (2006) 561–569*

**RESULTS AND CONCLUSION**

A strong exothermic reaction starting above 160°C is seen. That reaction is shifted to higher temperatures under argon, meaning an improved thermal stability.

**INSTRUMENT**

**CALVET**

**Ambient to 300°C**



- **HIGHEST HEAT MEASUREMENT ACCURACY**  
3D sensor based on thermocouples with Joule effect calibration.
- **ISOTHERMAL OR TEMPERATURE SCANNING MODES**  
for increased flexibility and replication of real life conditions
- **CONVENIENT INTERCHANGEABLE CRUCIBLES AND CELLS**  
to perform even the most demanding experiments using one instrument :
  - high pressure (1000bar) and high vacuum
  - pressure measurement and control
  - mixing/stirring experiments.
- **EXTERNAL COUPLING CAPABILITY**  
designed to increase your research options including manometry, BET instrumentation, gas analyzers, humidity controllers and gas panels