

Research and Application of Fiber Bragg Grating Temperature Sensor for Energy Storage Battery In-situ Detection

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Abstract

In-situ detection technology for internal parameters such as temperature, strain of battery is critical to the safety early warning of energy storage batteries and battery management system.

For the complex corrosive environment of internal lithium ion battery, it has the practical significance for developing a corrosion-resistant sensor which can be encapsulated inside the battery. This paper puts forward a new method of encapsulation of FBG temperature sensor, namely the use of special packaging process of encapsulated sensor grating area in fine glass tube, which involves the choice of glass tube length and diameter, and the control of glass tube end sealing. In this paper, repeated experiments on linearity, sensitivity, repeatability, the ability of eliminating stress and corrosion resistance of the new packaged FBG temperature sensor were carried out. The charge and discharge experiments at 0.3C / 0.5C / 1C / 2C are carried out on the batteries, through the acquisition of lithium ion battery internal temperature data, this paper analyzes the feasibility of lithium ion battery internal temperature measurement. And the thermal behavior of the energy storage battery during the charging and discharging process was analyzed by the collected temperature. The experimental results show that compared with the bare fiber grating sensor, the glass-packaged FBG sensor has good linearity, sensitivity, repeatability, the ability of eliminating stress and corrosion resistance, so it can be used in the temperature measurement of the internal of lithium ion battery.

The research of this paper provides an important reference for the assessment and evaluation of energy storage batteries.