

# Emission Test for Electric Vehicles

China  
2023.04

# Quick Review

## 1. Standardization requirements of GTR

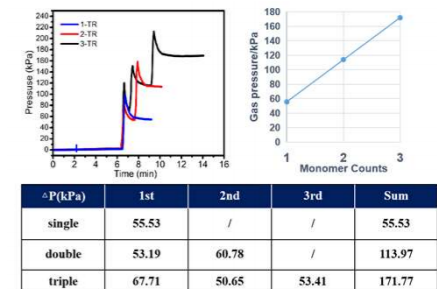
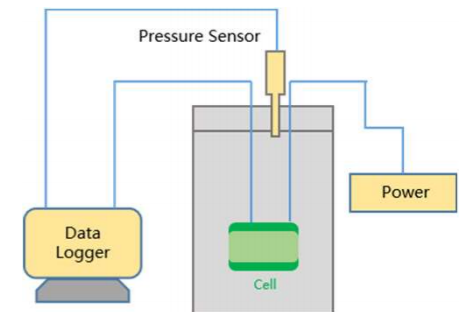
- **Phase 1** Several ideas from Japan, JRC and OICA were discussed but no suitable method  
It was not possible to research and analyse this in Phase 1. Therefore, it will be considered in Phase 2
- **Phase 2** A unified, repeatable, easy to implement method that can evaluate the impact of battery gas production on occupants.

## 2. Establish a multi-level emission test method

- Cell → Module → Pack → Vehicle
- Test device & Trigger Method & Collection Method & Analysis

## 3. Research progress of China

- **Cell Level:** The test method on cell level emission test was established, more data required
- **Module Level:** cell result multiplication (CRM) method is preliminarily explored
- **Vehicle Level:** Established vehicle level emission testing for LFP and NCM chemistry



# Emission Test Building



## Vehicle & Battery Information

- The test object is a pure electric SUV weighing about 2.2t
- This is a vehicle after a crash test, which is a frontal collision, and the external structure of the battery pack is not damaged
- The battery cell voltage is about 4V, its SOC can be estimated to be above 90%



# Preparation before test

- The battery pack consists of 8 modules, each with 18 cells
- Remove the upper cover of the battery pack and modify it before testing
- The position of the heater is shown in the figure, and 500W constant power is used for heating
- A total of 49 thermocouples and 22 sets of voltages are arranged in the package
- After the modify, restore the battery pack to its original state on the vehicle

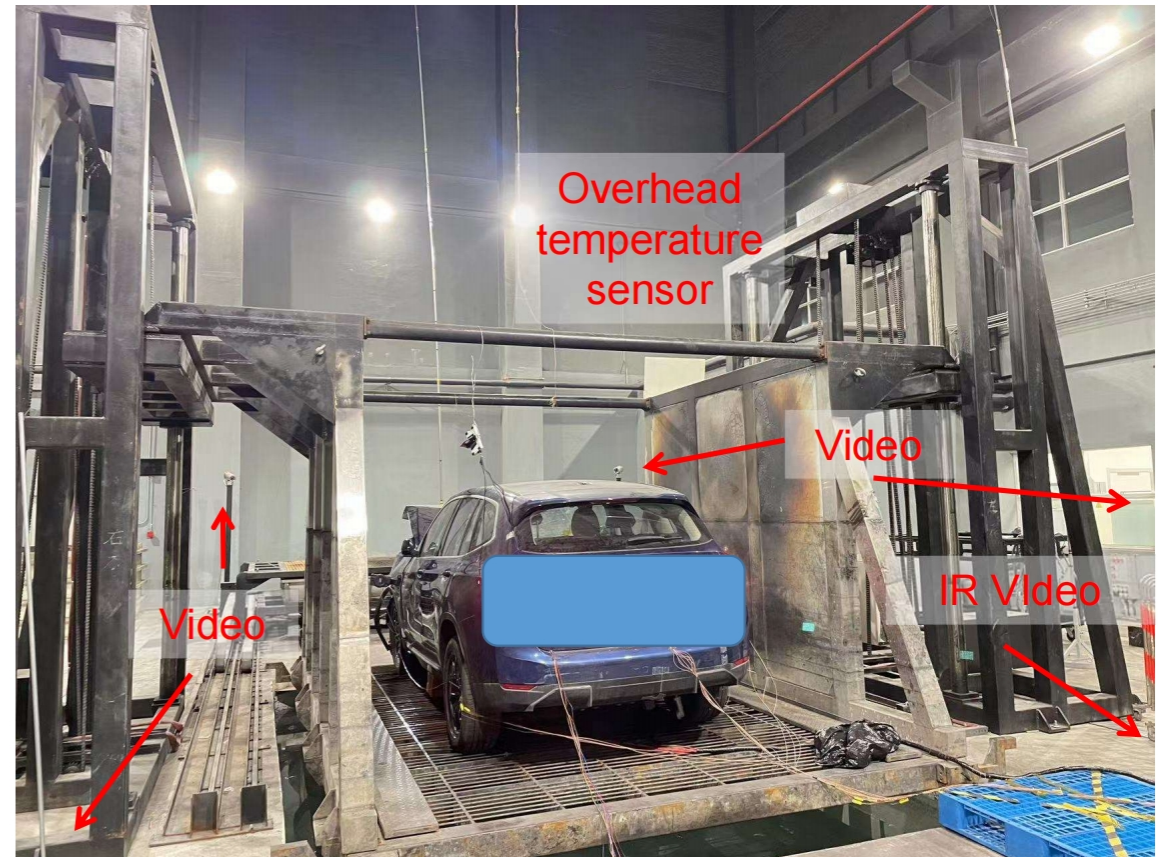


temperature

voltage

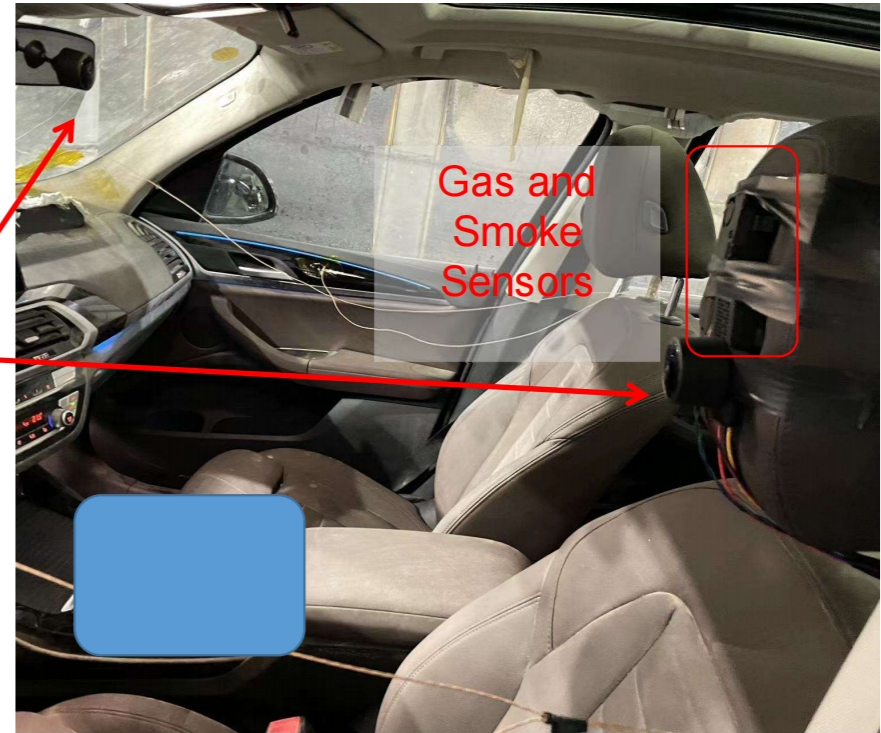
## Preparation before test

- 4 Video is arranged around the vehicle
- IR video monitoring is arranged at the rear of the vehicle
- Temperature sensors are arranged at the wheels, roof, and seats



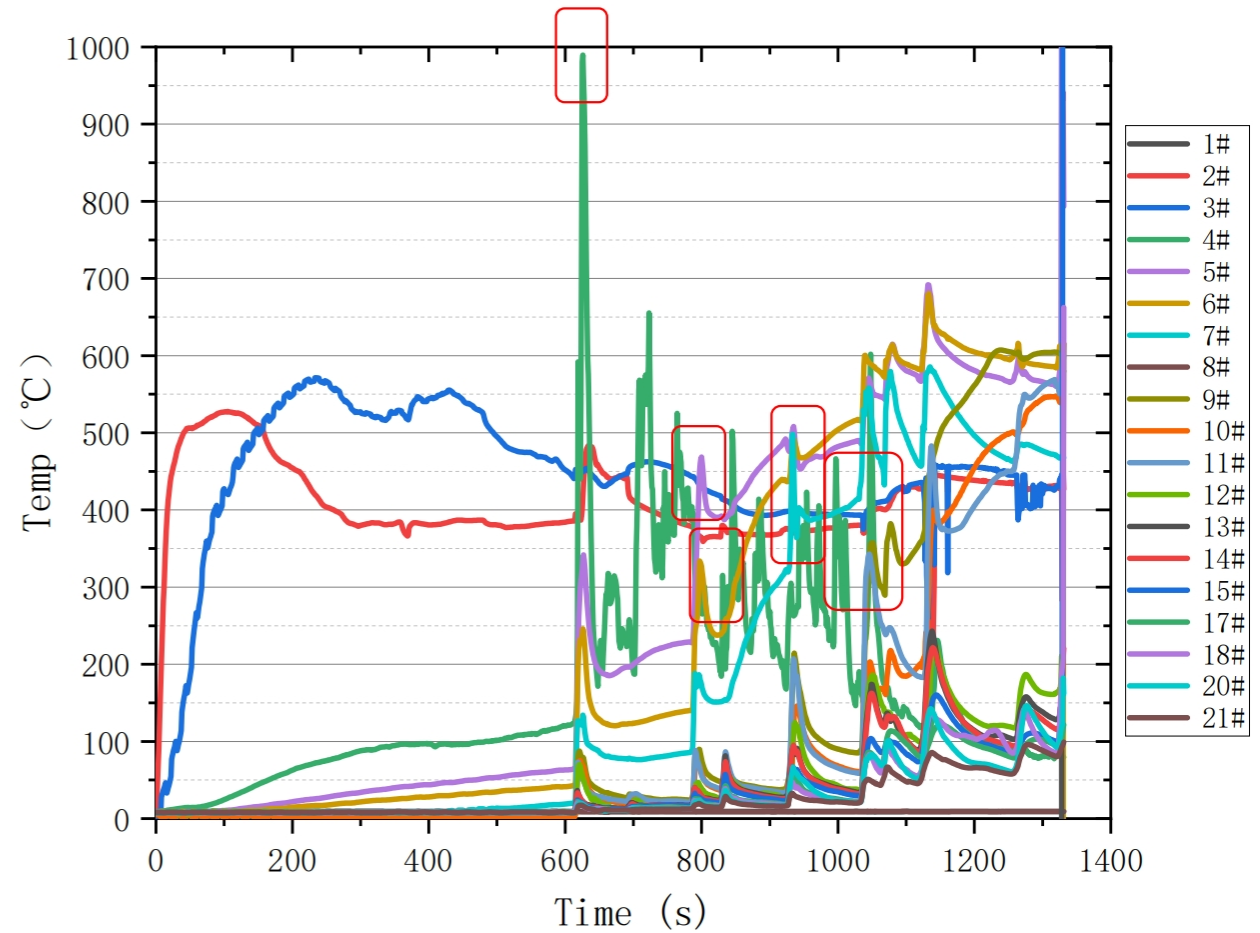
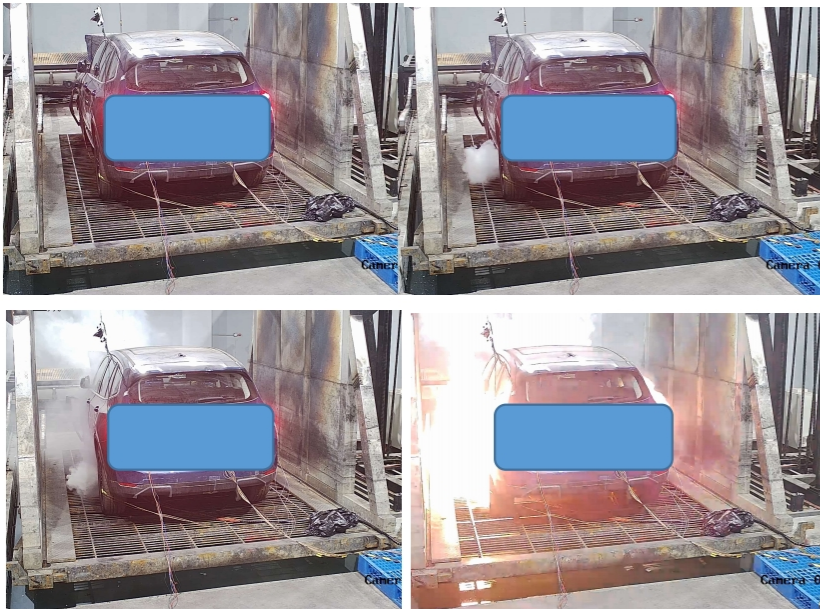
## Preparation before test

- 3 Videos are arranged inside the vehicle
- Gas and smoke sensor is on the driver's headrest



# Test results

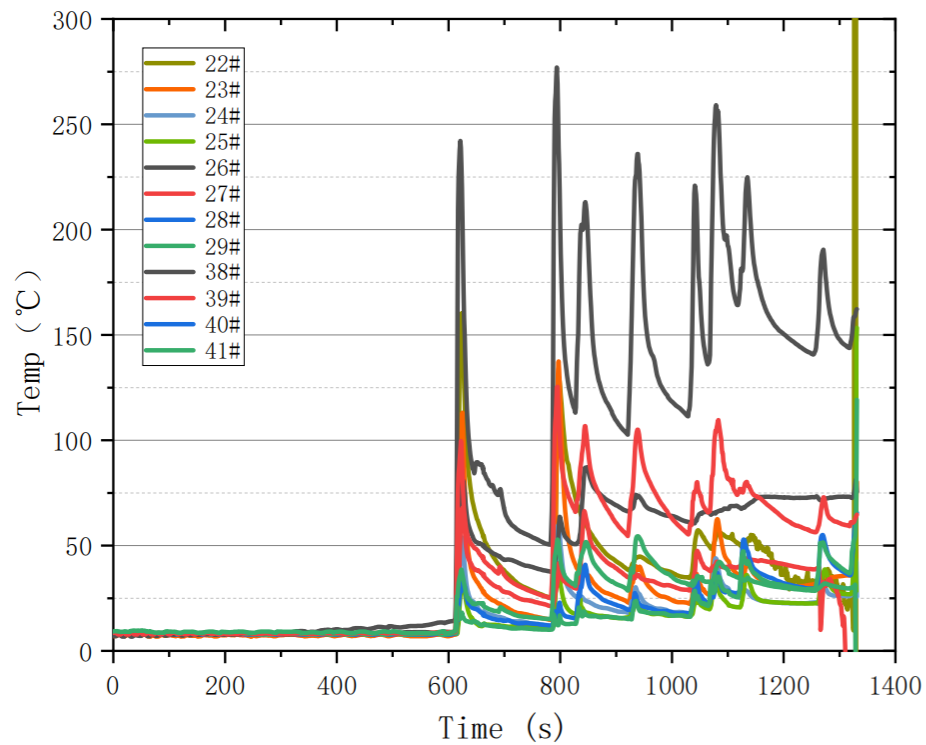
0:00:00 Test Start  
0:10:16 1st cell TR  
0:13:11 2nd cell TP  
0:13:56 3rd cell TP  
0:15:31 4th cell TP  
0:17:16 5th cell TP  
0:17:28 Vehicle catch fire





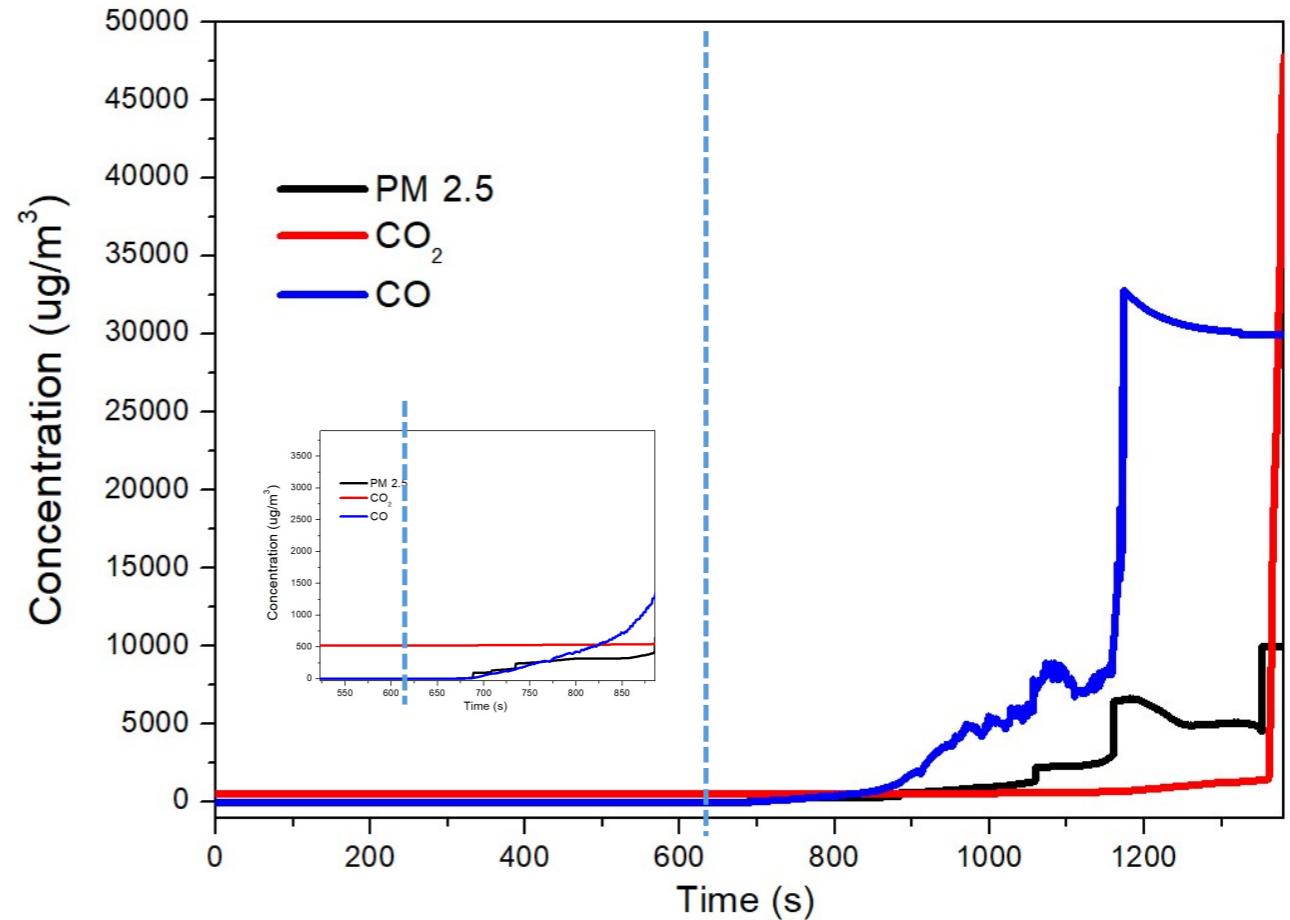
# Test results

- The test results indicate that thermal propagation occurs along the module structure
- Temperature of adjacent modules is below 300°C, did not trigger TP before fire



# Emission Analysis

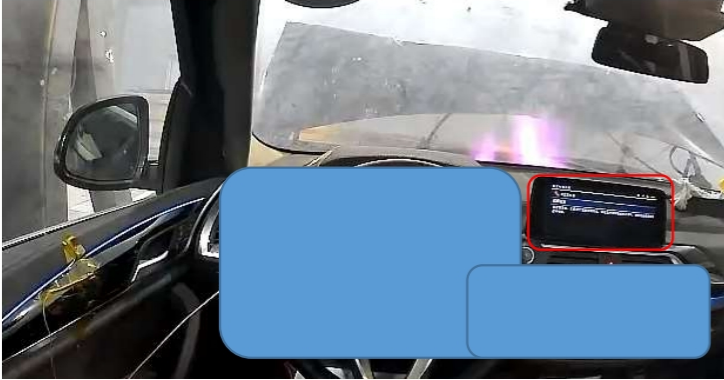
- Significant increases in smoke and carbon monoxide in the passenger compartment at about 0:11:27
- The concentration of carbon monoxide is significantly higher than that of carbon dioxide



## Additional information

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- 00:17:59 Additional alarm appear on the vehicle screen



- 00:22:21 Visible smoke appears in the passenger compartment



## Next Plan

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- Corresponding cell and module level test of this NCM battery
- Try to verify the effectiveness of cell result multiplication (CRM) method
- Carry out more pack level and vehicle level tests