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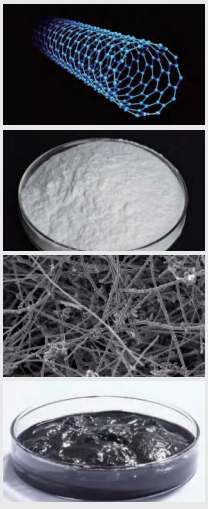
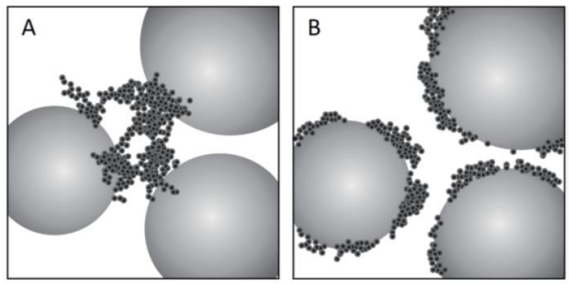
# BATTERY SLURRY RESISTIVITY



## THE SIGNIFICANCE OF SLURRY RESISTIVITY

◈ The slurry is an important intermediate product during the production of lithium-ion batteries (LIBs). The uniformity and stability of the slurry greatly affect the consistency and electrochemical performance of the final LIBs. Currently, only the parameter of viscosity is used to monitor the slurry, which is unable to accurately evaluate the uniformity and stability of its electrical properties. However, the conductivity of slurry, associated with theslurry formulation, conductive agent type and content, binder type and ontent etc, has significant correlation tothe electrical performance of slurry. Moreover,the slurry may gel and deposit after standing for a period of time . At this time, the conductivity value will also become inhomogeneous in the vertical direction. Therefore, the conductivity of the slurry is a useful parameterto characterize the uniformity and stability of the electrical properties of the slurry.



B.G. Westphal et al. / Journal of Energy Storage 11 (2017) 76–85

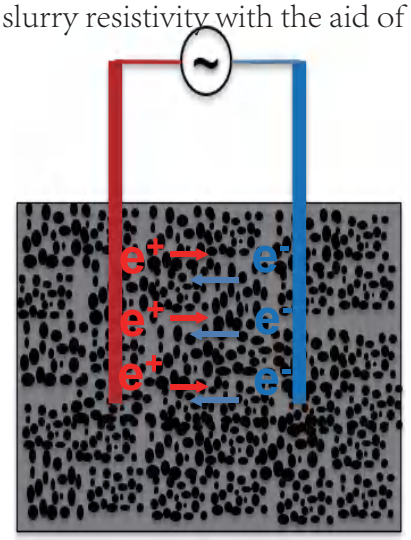
◈ **Monitoring the conductivity of the slurry, not only , it can evaluate the influence of different active materials, conductive agents, binders, solid content, etc. on the electrochemical performance of the slurry, but also it can also be used for monitoring the process stability, which can quickly identify abnormalities in the mixing process, and avoid the waste of time and cost caused by defective slurry flowing into the subsequent process.**

## SLURRY RESISTIVITY TEST PRINCIPLE

**Test steps:** Putting a certain volume of slurry (~80mL) into the measuring glass, inserting a clean electrode pen, and starting the software, then the BSR will start to test the slurry resistivity with the aid of three pairs of electrodes and save these data in the file.

**Test parameters:** Resistivity, Temperature, Time

**Calculation formula** Resistivity (Ω*cm): $\rho_e = \frac{U}{I} \times \frac{S}{l}$




**Charactor:**

1. Separate the voltage and current lines, eliminate the influence of inductance on voltage measurement, and improve the accuracy of resistivity detection;
2. The disk electrode with a diameter of 10mm ensures a relatively large contact area with the slurry and reduces the testing errors;;
3. Monitoring the changes of resistivity of the slurry in real time at three positions in the vertical direction over time;

| | |
|---|---|
| Resistivity measurement range | 2.5Ω*cm~50MΩ*cm |
| Resistivity measurement accuracy | ±0.5% |

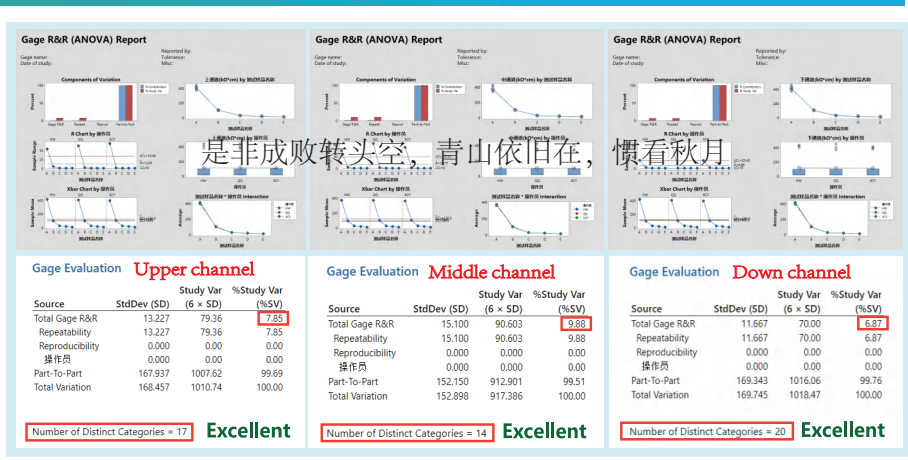
## SLURRY RESISTIVITY ANALYZER MSA

**Test program :**

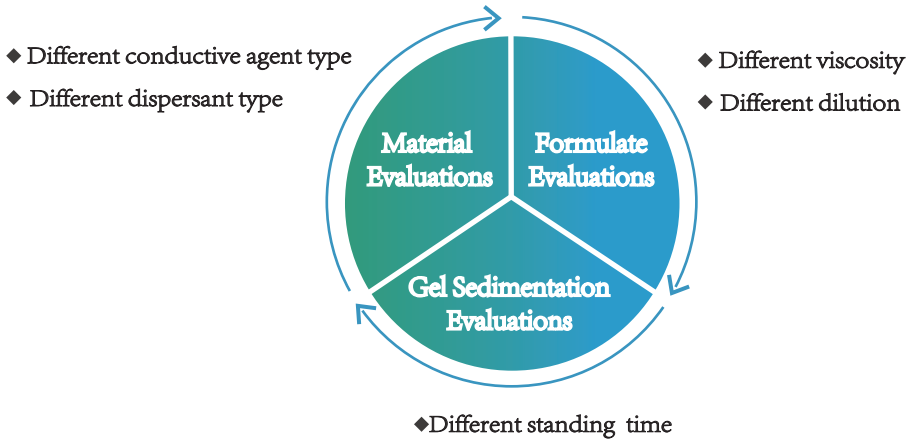
Three operators, five parallel samples, and random testing

**Test method :**

Sonicating the electrode pen with deionized water for 30 seconds, and drying it with the dust-free paper. Then five parallel samples was tested, and the fifth set of data was taken for the GRR analysis

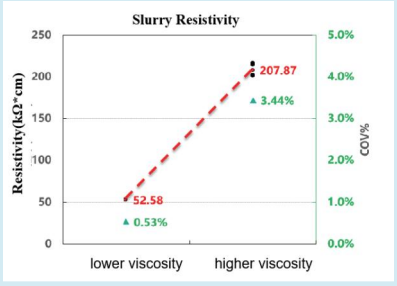


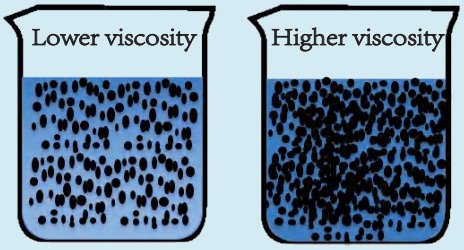
## APPLICATIONS




## APPLICATION CASES

### 1.Evaluations of **different viscosity** in slurry resistivity

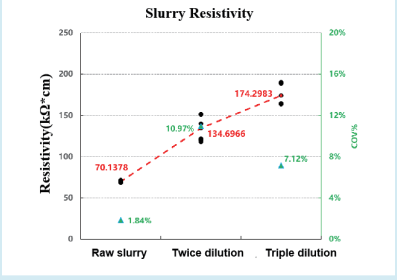


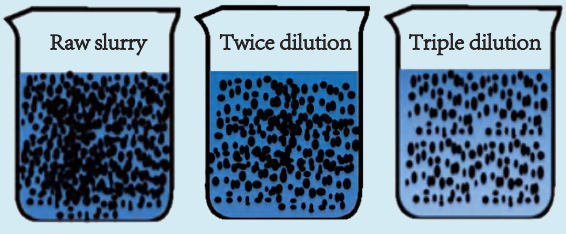




◈ The resistivity becomes lower and conductivity becomes better with the increase of the viscosity!

◈ **It is possible to formulate suitable specification for the slurry with fixed viscosity, and monitor the mixing stability of the slurry.**

### 2. Evaluations of **different dilution** multiples in slurry resistivity

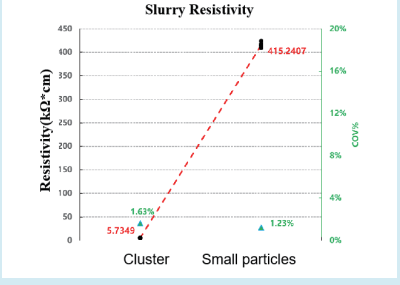


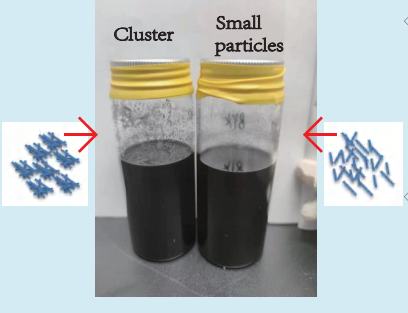




◈ The resistivity increases and the conductivity decreases with the increase of the dilution times!

◈ **It is possible to formulate suitable specification for the slurry with fixed dilution multiples, and monitor the mixing stability of the slurry.**

### 3. Evaluations of **different dispersant** in slurry resistivity

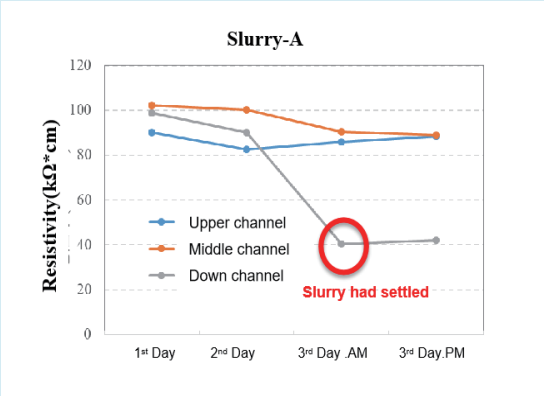


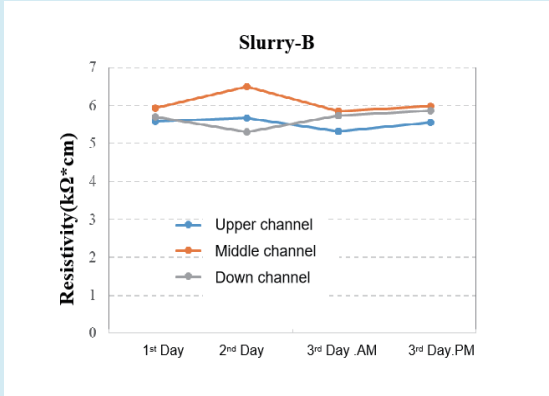



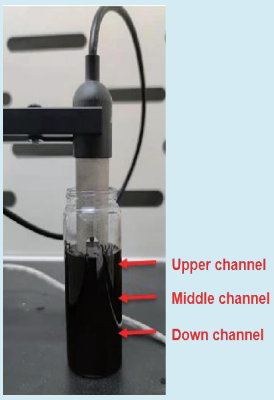

◈ Different dispersants added to the conductive carbon slurry will affect the dispersion states of the conductive carbon. The resistivity of the conductive carbon slurry dispersed in the state of clusters is lower than that of in the state of small particles!

◈ **It is possible to formulate suitable specification for the slurry with a certain dispersant, and monitor the mixing stability of the slurry.**

## 4. Gel sedimentation evaluations： Comparing different types of conductive




- After standing for three days, the resistivity of slurry-A at down channel became significantly lower than those at middle and upper channel, indicating that the active materials in the slurry sank down into the bottom of the cup.
- After standing for three days, the resistivities of slurry-B at all three channel are almost unchanged, indicating that there was no obvious sedimentation in slurry-B;.
- It is possible to formulate suitable standing time for a certain kind of slurry, and monitor the uniformity of the slurry!

| PARAMETERS | |
|---|---|
| Resistivity measurement range | 2.5Ω*cm~50MΩ*cm |
| Resistivity measurement resolution | 0.01μS/cm |
| Resistivity measurement accuracy | ±0.5% |

| INSTALLATION REQUIREMENT | |
|---|---|
| Voltage | 220~240V/50~60Hz |
| Voltage variation tolerance | 10% |
| Power dissipation | <80W |
| Environmental temperature | 0~40℃ |
| Environmental humidity | <80%RH |
| Net wet | 5Kg |
| Dimension(W*D*H) | 210mm*300mm*120mm (W*D*H) |

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