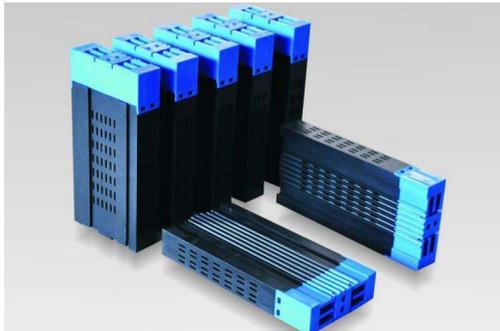


Microwave Drying Equipment for Lithium Ion Battery Materials

As a highly efficient and clean new energy source that can be recycled, secondary battery can comprehensively alleviate energy, resource and environmental problems. Due to its high energy, high power and long life, it has good development in energy storage, electric vehicles and environmental protection. Among the secondary batteries, lithium ion batteries have the fastest development and the largest output.

In the process of industrial production of lithium ion battery, the drying process of ternary material is the main link of magnetic foreign body introduction. Selecting a good drying technique is very important to reduce the amount of magnetic foreign bodies introduced.

The microwave drying equipment for lithium ion battery materials successfully solved the problems of high magnetic foreign matter introduction, uneven drying, poor dispersion and easy agglomeration in ternary materials for lithium ion battery.



Microwave drying has the following characteristics:

1. Because microwaves can be heated deep inside the material rather than by the heat transfer of the object itself, the heating time is very short. Microwave drying machine of lithium ion battery material is 50% or more shorter than traditional drying method.
2. Lithium ion battery material microwave drying equipment heating temperature uniform, consistent with table and table, dry products can achieve even water distribution.
3. Due to the selective heating of water by microwave, the microwave drying equipment for lithium ion battery materials can be used for drying at a lower temperature without overheating and damaging the dry materials in the products.
4. Microwave heating can also produce some beneficial physical or chemical effects.
5. By adjusting the microwave output power, the heating condition of the material can be changed instantly. Microwave drying lithium ion battery material equipment is convenient for

continuous production and automatic control, improving labor productivity and working conditions.

6.Lithium ion battery material microwave drying equipment itself does not consume heat, most of the heat energy is acting on the material, high thermal efficiency, energy saving, generally can save 30% ~ 50%.

7.Microwave drying has little effect on the ambient temperature, and the microwave drying equipment for lithium ion battery materials can be made smaller.

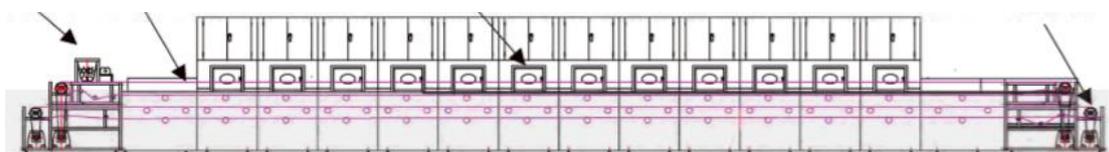


Composition of Microwave drying equipment produced by Leader Microwave Equipment Company:

Continuous microwave drying equipment is mainly composed of feeding system, microwave heating system, material conveying mechanism and discharging system.

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Wet materials are transported from the feeding system to the transmission belt, and enter into the microwave cavity through the material conveying system. Under the effect of microwave, the exhaust gas is quickly dried and discharged from the machine by natural air diversion.



Schematic diagram of continuous microwave drying

Comparison between microwave drying and traditional drying:

1. Magnetic foreign bodies introduce contrast

Compared with magnetic foreign bodies introduced in different drying methods, magnetic foreign bodies introduced in materials dried by microwave were very low, and a large number of magnetic foreign bodies were introduced in flash drying method and disc drying method.

Using the microwave drying equipment of lithium ion battery material, the material is dried directly on the conveyor belt of non-woven fabric material without contact with the iron material equipment, so there is basically no magnetic foreign body introduction.

Flash drying or disc drying due to the characteristics of the equipment itself, it is impossible to avoid the contact between materials and metal components, thus introducing magnetic foreign matter, which seriously affects the safety performance of battery materials.

2. Powder dispersion comparison

Although both drying methods are static, they avoid dynamic wear of parts and materials in the drying equipment and reduce the introduction of magnetic foreign bodies. However, microwave drying belongs to internal heating, which directly acts on water molecules. The material medium is heated inside and outside at the same time. The temperature difference is small and the heating is uniform.

The oven is used for drying by external heating. After drying, the materials are prone to agglomeration, poor dispersion of products, serious bridging between particles, and many pores. In order to ensure the performance of products, depolymerization treatment is required.

3. Relative dry matter

There is no significant difference between the precursors of the same batch of lithium ion batteries dried by microwave and oven, and microwave drying has no effect on the physical structure of the products.

4. Drying efficiency contrast

The drying time of microwave drying is the shortest, and the drying efficiency is obviously better than flash drying, disc drying and oven drying. The traditional drying method is

external heating and drying. After absorbing heat on the surface of the material, the heat penetrates into the interior of the material through heat conduction, and then heats up and dries;

Microwave-dried wet materials are in the microwave high-frequency electric field with extremely short oscillation period, and the water molecules inside them will be polarized and arranged in order along the direction of the microwave electric field, and then rotate rapidly with the interactive change of the direction of the high-frequency alternating electric field.

And produces the violent collision and the friction, the result partial microwave energy transforms into the molecular movement energy, and manifests in the form of the heat, causes the water temperature to rise to leave the material, thus causes the material to get the dry.

The adoption of microwave drying equipment for filter cake precursor of lithium ion battery greatly improves drying efficiency, reduces energy consumption and saves production cost.

5.Primary yield of product

After microwave drying materials do not form bond and agglomeration.

However, materials in traditional static drying methods, such as disc drying and oven drying, are easy to form aggregates, which require subsequent screening treatment, screening of large particles, and depolymerization of large particles.

Moreover, the increase of depolymerization process increases labor intensity and equipment investment, which is not conducive to the continuous production and the improvement of labor efficiency.

Parameters of microwave drying equipment for lithium ion battery materials:

Item	Detail		
Model	DL-6	DL-10	DL-16
The daily capacity	6T	8T-10T	15-20T

Picture presentation			
Total power	24KW/h	30KW/h	54KW/h
Size (mm)	7000x840x1800	10500x840x1800	13500x1200x1800
Transport speed(adjustable)	0-5m /min		
Floor space (L * W * H)	30 * 10 *8m	30 * 10 *8m	40 * 10 *8m
Microwave frequency	2450/915MHz		
Energy	electricity		
Leakage value	$\leq 3\text{mw/m}^3$		
Working method	bunch, continuous		
Cooling method	water-cooling		
Lifetime	5-8 year		

Trouble shooting:

1.How to guarantee after sale?

After the purchase of equipment, customers pay a certain amount of quality retention money, some parts can be guaranteed for 2 years.

2.How soon can you ship the equipment after you order it?

When customers order the microwave drying equipment for lithium ion battery materials and microwave vacuum dehydrator, they need to provide specific information such as processing materials, output requirements and plant conditions.We will build high quality and efficient equipment according to the actual requirements of customers, and complete and deliver the equipment as soon as possible. Specific matters can be timely negotiated

and communicated.

The chemical composition of the filter cake, the precursor of lithium ion battery after the microwave drying equipment for lithium ion battery material, has not changed, and its dispersibility and product consistency are better than that of the oven drying, which is also static drying. Filter cake microwave drying machine for lithium ion battery precursor has the best primary yield of mechanical products, which improves the safety performance of battery, reduces production cost and improves labor efficiency.