

Introduction

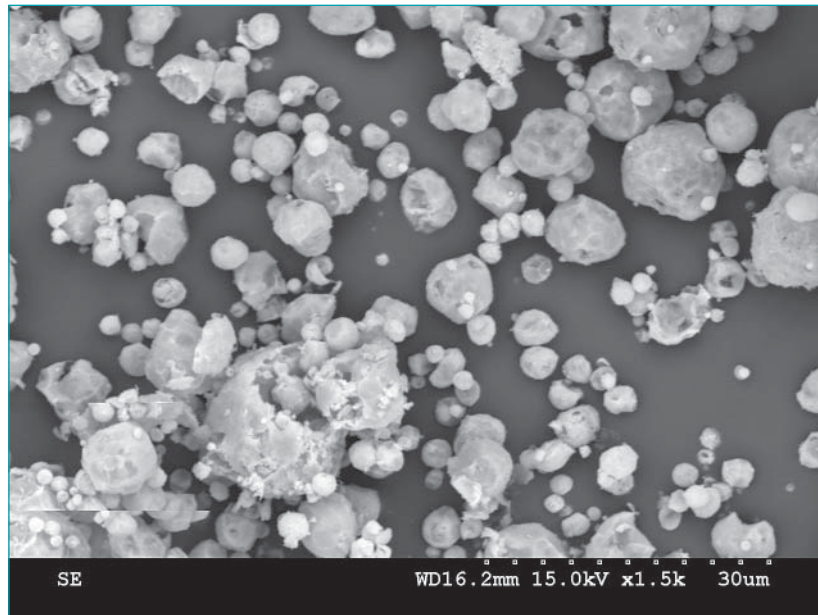
Spray pyrolysis is a powerful technique to synthesize a wide variety of high purity, chemically homogeneous ceramic powders. Large quantities of oxide powders with homogeneous particle sizes and crystallite sizes less than 100 nanometers may be produced by this method, which is both simple and allows for continuous operation. Due to the small crystallites, the powders offer the opportunity to tailor materials on a nano-scale.

Working Principle

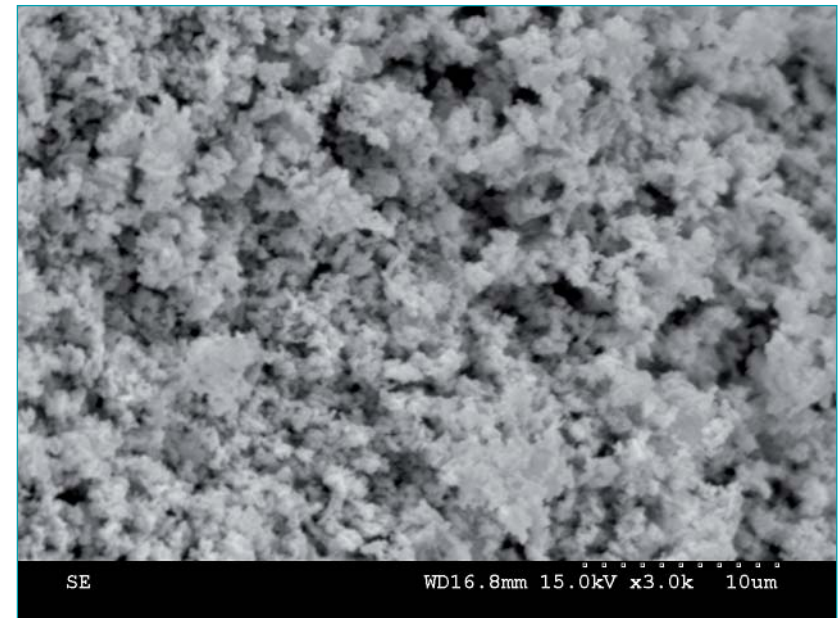
A water-based precursor solution is fed into a rotating furnace through a nozzle. In the hot-zone, the atomized solution is dried and the constituent metal salts decompose and form an intimate metal oxide mixture. The spray pyrolysed powders are collected in a cyclone and are submitted to tailor-made post synthesis treatment.

Powder Characteristics

- Wide variety of multi-component compositions possible.
- Homogeneous mixtures of cations on an atomic scale.
- The morphology of the particles produced by spray pyrolysis can (to some degree) be controlled by the choice of precursors, concentration, droplet size and the residence time in the furnace.
- Crystallite size < 100 nm.



Spray pyrolysed $\text{La}_{0.7}\text{Sr}_{0.3}\text{CoO}_3$ direct from pyrolysis (left) and after calcination and ball-milling (right).



Process Details

Precursor Solution

Metal salts (nitrates, acetates etc) are dissolved in stoichiometric amounts in water to obtain a precursor solution. Organic complexing agents are used in case of low water-solubility of the salts. Recipes may be customer-supplied or developed by us.

Spray Pyrolysis Operating Conditions

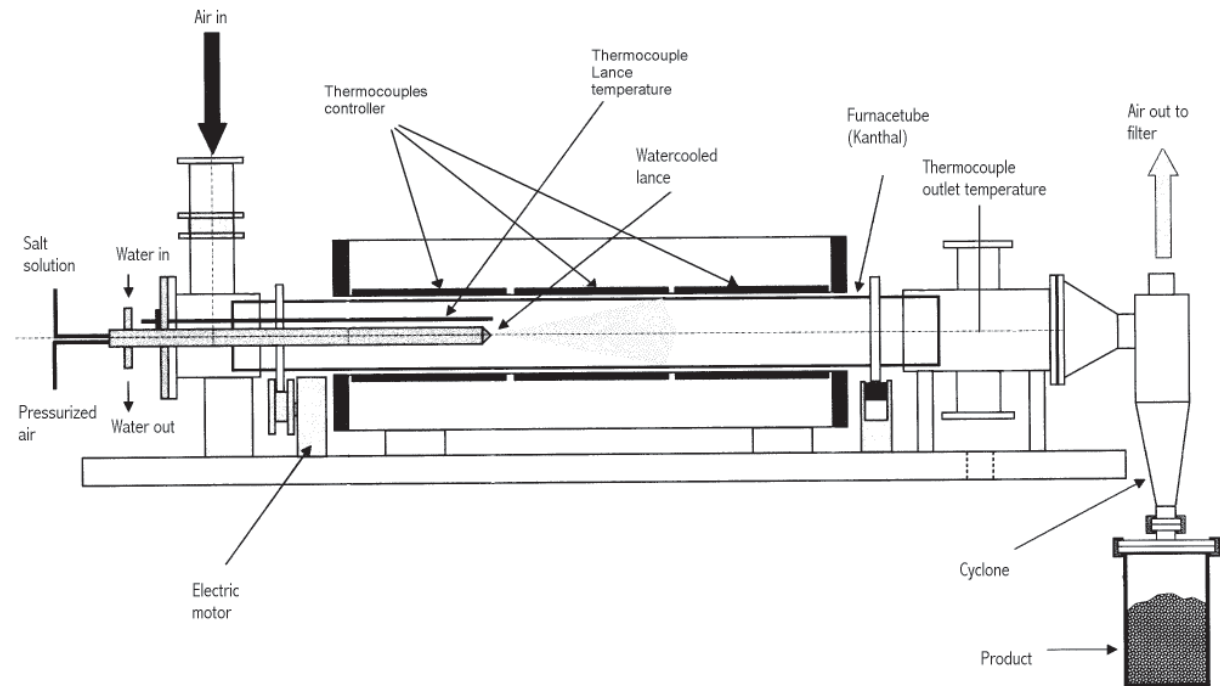
- Typical feed rate: 8 l/h
- Furnace temperature: < 1200°C
- Production capacity: 0.1-3 kg powder/day

Post-Treatment of Powders

- Calcination and ball-milling (wet or dry)
- Customized

Characterization of Powders (Optional)

- Powder X-ray diffraction
- BET surface area analysis
- Scanning Electron Microscopy analysis
- Thermal analysis (dilatometry, thermogravimetry, differential thermal analysis)
- Particle size analysis



Contact: