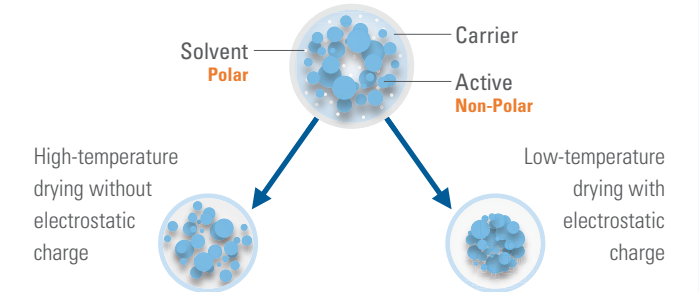
ELECTROSTATIC SPRAY DRYING

CASE STUDY

LAB RESEARCH DEMONSTRATES FASTER, MORE STABLE PROTEIN SOLID FORMULATION

The pharmaceutical industry has long relied on freeze drying, or lyophilization, in the manufacture of physically and chemically stable protein products. Unfortunately, freeze drying is time and energy consuming, and often requires additional steps to generate particles of a specific size.

By contrast, spray drying offers time and processing advantages, but high temperature and other stresses can reduce protein stability.



In electrostatic spray drying, applying an electronic charge results in the polar solvent picking up more electrons than the solute, driving solvents to the surface during droplet formation and encapsulating active in the core.

As interest in producing biological solids such as inhalable insulin and topical clotting agents grows, electrostatic spray drying offers the benefits of both legacy processes—lower temperatures reduce active degradation while spray drying allows more efficient processing.

Challenge

Researchers at Purdue University sought a more time- and energy-efficient way to produce a monoclonal antibody powder without compromising protein stability.

Outcome

Electrostatic spray drying produced dry powder with superior physical stability and satisfactory moisture content at just 70°C.

Impact

Electrostatic spray drying opens the door to more efficient, effective manufacturing of thermal-sensitive pharmaceuticals, nutraceuticals and more, to help bring important innovations to market.

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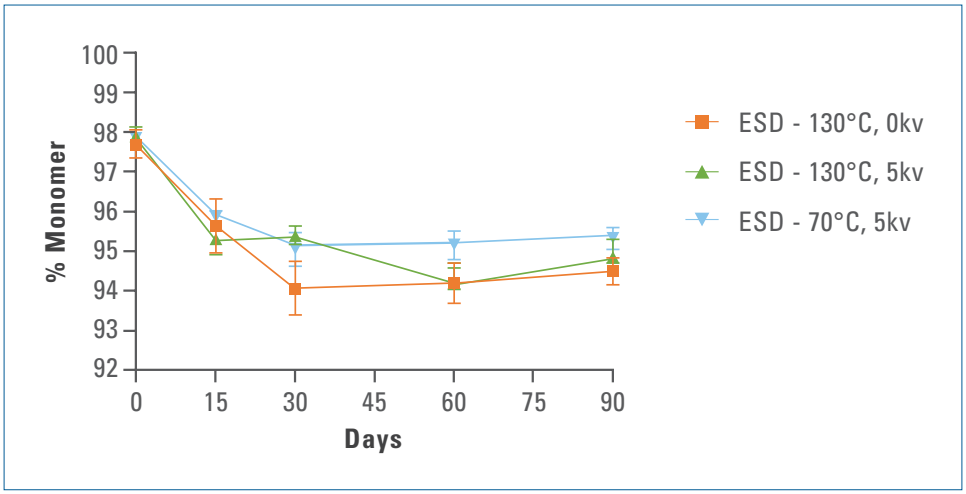
PURDUE RESEARCHERS PUT POLARDRY® TO THE TEST

The Purdue team worked with Fluid Air to identify and leverage the right electrostatic spray drying technology, using the tabletop PolarDry Model 0.1 spray dryer.

Pharmacy scientists compared the stability of protein solid formulations produced by traditional spray drying and electrostatic spray drying, conducting multiple runs at varying temperatures, feed rates and voltage. They analyzed moisture content, powder diffraction, particle size distribution, morphology, stability over time, and more based on best practices and state-of-the-art techniques.

The team found that at the low inlet temperature of 70°C, electrostatic spray drying produced a more homogeneous dry powder of their formulation with greater stability and shelf life, making it an appealing option for protein-based products.

Lead researcher, **Tarun Mutukuri**, PhD, from Purdue University, discusses his findings at AAPS 2021 PharmSci 360



At 70°C, electrostatic spray drying led to a product that remained stable over time.

Additional Details

For more details, read the abstract or contact us for the full study.

Improve or establish your own processes with the help of the Fluid Air testing lab. Use our facilities or your own and leverage our industry expertise to determine the best solutions for your products. Reach out today.

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