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CINCH - Controlled Ice Nucleation Charge Gas Humidifier

Humidity-controlled lyophilization system improves freezing efficiency, process control, and product quality in pharma manufacturing.

Researchers at Purdue University have developed a system to monitor and control humidity in lyophilization chambers. Lyophilization is a freeze-drying process used for drug synthesis and several other processes in pharmaceutical companies. During the freezing stage of lyophilization, the water vapor near the product creates an ice fog. This ice fog serves as a nucleation site, helping the supercooled water in the vial freeze. Humidifying the charge gas prior to depressurization leads to a greater probability of nucleation. The Purdue technology is the first technology to allow control over the humidity of the lyophilization chamber. Controlling the humidity allows more control over the time, temperature, and pressure at which freezing occurs. This allows selection of process characteristics that better suit the product.

Technology Validation: The researchers successfully humidified the chamber gas to 25%, 50%, and 75% relative humidity (RH) levels; they observed the lowest temperature decrease required for freezing for the 75% RH system.

Advantages:

- First technology to allow control over chamber humidity

- Allows more control over process characteristics

- Can provide lower freezing times/temperature drops with higher humidity levels

Applications:

- Humidifying process chamber in lyophilization

TRL: 4

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Category
Biotechnology & Life Sciences/Bioprocessing & Biomanufacturing
Pharmaceuticals/Drug Discovery & Development

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