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Development of an adsorption dehumidification system to supply dry air for the cryogenic refrigerator

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When a cryogenic cooling system is implemented, humidity control of the facility space is very important, and the input of latent heat energy due to condensation sometimes adversely affects the performance of the cryogenic freezer. The adsorbent-based dehumidification system to be developed in this study has the advantage of improving the cooling efficiency of the cryogenic freezer by controlling the moisture in the equipped space and reducing the overall process energy consumption. In the case of adsorption-type dehumidification, since dehumidification is performed using the adsorption and desorption phenomenon of an adsorbent, it does not require a temperature below the dew point temperature like a dehumidification system using an existing vapor compression system, so energy consumption is low, but a heat source above room temperature for desorption may be required. Since a relatively large amount of energy can be consumed to produce hot air for desorption, research on the development of adsorbents with a relatively low desorption temperature is being conducted. The adsorption-based dehumidification system to be developed in this study is a system capable of continuous adsorption and desorption processes at 30 ℃ and 45 ℃ , and in the case of desorption temperature, it is expected that heat from waste heat or cryogenic cooling processes can be recovered and used.

Submitters Country

South Korea

Author: LEE, Jung-Gil (KITECH)

Co-authors: Dr LEE, Cheonkyu (KITECH); Dr CHA, DongAn (KITECH); Dr PARK, In (KITECH)

Presenter: LEE, Jung-Gil (KITECH)

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