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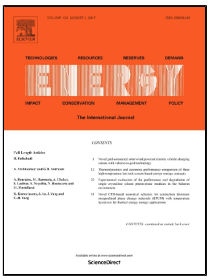

Experimental investigation on a novel heat pump system based on desiccant coated heat exchangers

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Abstract The solid desiccant heat pump (SDHP) system is a novel thermodynamic appliance, intended to improve the energy efficiency of the conventional air conditioning. In the SDHP, desiccant coated heat exchangers are adopted as the evaporator and the condenser instead of the conventional sensible heat exchangers. This article aims to investigate the performance of the SDHP under typical weather conditions. Experiments are conducted to evaluate the system in terms of the supply air condition, the electricity consumption and the coefficient of performance (COP). The experimental results show that the system can obtain high COP and improved supply air quality. With the outdoor air of 36.3°C, 23g/kg, it can provide cold and dry supply air of 26 °C, 8.9g/kg and the corresponding COP reaches to 7.0. In winter, the system can realize heating and humidification simultaneously. With the outdoor air of 9.4°C, 4.4g/kg, the supply air from the system is 26.6 °C, 14.1g/kg and the COP reaches up to 6.3.

Key words heat pump system; desiccant coated heat exchanger; COP; experiments;

Nomenclature

COP	coefficient of performance	**Subscript**	
DCHE	desiccant coated heat exchanger	*a*	Air
HPD	heat pump desiccant	*all*	Overall
SDHP	solid desiccant heat pump	*comp*	Compressor
THIC	temperature and humidity independent control	*in*	Inlet
VC	vapor compression	*out*	Outlet
VRF	variable refrigerant flow	*lat*	Latent
d	Air humidity ratio (g/kg)	*sens*	Sensible
D_t	Transient dehumidification ability (g/kg)		
h	Enthalpy (kJ/kg)		