

# ENERGY AND MATERIALS RESEARCH

December 06-07, 2017 Dallas, USA

## Water vapor sorption study on starch micro-sphere (SM) as an alternative bio-desiccant for energy wheel

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The study of water vapor sorption on starch microsphere (SM) has been investigated as an alternative desiccant for energy wheel application. Using laser particle size analyzer for SM material, a particle diameter of 15  $\mu\text{m}$  is measured and using  $\text{N}_2$  gas adsorption test, accessible surface area and pore volume are found to be of 2.89  $\text{m}^2/\text{g}$  and 0.0065  $\text{cm}^3/\text{g}$  respectively. A swelling (water) test has performed to find the water adsorption capacity. Better accessible surface area, pore volume and % swelling ( $\text{H}_2\text{O}$ ) indicated that SM might be used as an alternative desiccant for energy wheel. However, to estimate the performance of SM coated energy wheel, some transient tests on SM coated small-scale exchanger had to be carried out. In this paper, using the transient temperature and humidity characteristics, the performance (latent effectiveness) of SM coated exchanger will be estimated. Later on, the latent effectiveness of SM coated exchanger will be compared with alike silica gel (SG) and high amylose starch (HAS) coated exchangers. This comparison will help us to know the potential of SM for energy wheel application. In addition to this, several coating techniques for starch microsphere will be discussed and a better coating technique will be suggested so that a uniform and monolayer coating of SM on metal plates can be assured. It is expected that this research information on starch microsphere will open the new door to HVAC designers and researchers.

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