

Electroosmotic Dehumidification

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ABSTRACT

Conditioning air requires control of ambient temperature and moisture levels. Current air conditioning systems typically couple the temperature and moisture conditioning processes by passing air through a heat exchanger maintained at a level sufficiently below the dew point temperature such that both water removal and temperature conditioning occur. Generally, this process overcools the air, requiring a “reheat” section. Also, the moisture conditioning process is dependent on the cooling process, which constrains the ability to independently adjust the moisture level and reduce the system efficiency. Independent moisture control methods using thermal desiccants are available; however the cost, efficiency and complexity of these systems have not led to significant use.

The focus of this research is the development of a new type of material for controlling the moisture level in conditioned environments. The goal is to demonstrate and model a material in which a “desiccant” (moisture absorbing) characteristic is combined with an “electroosmotic” effect such that moisture can be absorbed and “pumped” away from the absorbing surface.

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