Preparation and heat-moisture properties of phase change hygroscopic materials - DTU Orbit (27/07/2019)

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A new composite phase change humidity material (CMPCM) was prepared, which has the functions of temperature regulation and humidity controlling. It was synthesized by composite microencapsulated phase change material (MPCM) and porous humidity control material. CMPCM can effectively stabilize the indoor temperature as well as humidity fluctuations, and reduce building energy consumption as a passive energy-saving material. The MPCM was synthesized by sol-gel method with a mixture of capric acid and octadecanoic acid (PCM) as core, and SiO$_2$ as shell. The diatomite was selected as porous hygroscopic material. The performance of composition and structure, thermal properties, thermal stability, moisture transfer coefficient and moisture buffer value were characterized by scanning electron microscopy (SEM), differential scanning calorimetry (DSC), thermal gravimetric analysis (TGA), positive cup evaporation method and isothermal sorption method respectively. DSC and TGA results showed that the super-cooling degree of CMPCM was lower than that of PCM, and the initial degradation temperature of CMPCM was higher than that of PCM. Moisture Transfer Characteristics Test showed that the moisture transfer coefficient and moisture buffer value of CMPCM were higher than that of classical materials.