Sid Gamoj: Cycling Erythritol

We are testing the durability of erythritol over a five-month period of thermal cycling. Four separate beakers of erythritol were thermally cycled at four different temperatures to determine how erythritol degrades. A few hours of data are shown below.

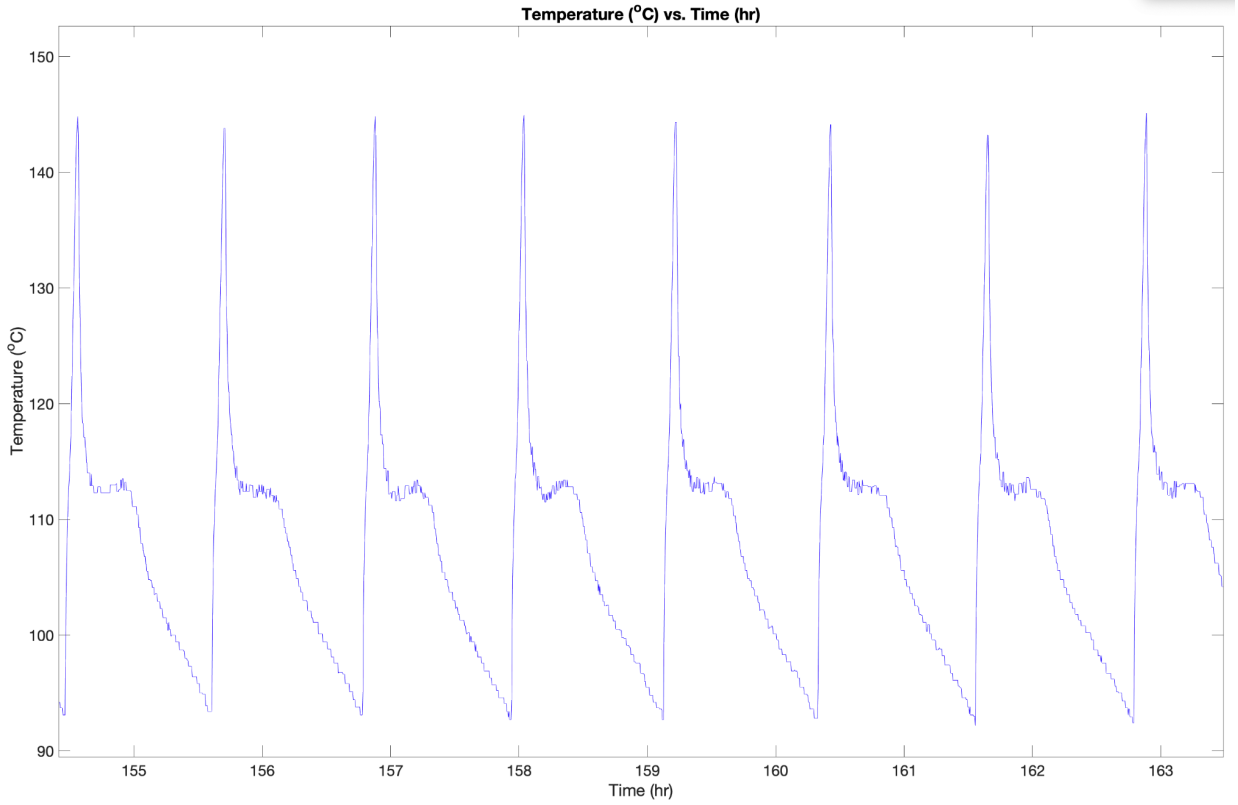

Fig. 19 Erythritol was thermally cycled between 95°C and 145°C over a week-long period. Nine hours are shown.

Elsa Micklin & Daniel Nagy: Testing PCM durability and degradation

To quantify the energy being absorbed and released during the phase change material's transitions, pure and degraded samples of erythritol and xylitol were run through a differential scanning calorimeter (DSC). The DSC subjects the sample to a given routine heating and cooling at specified temperatures, generating graphs of the heat flow [W/g] versus time or temperature.

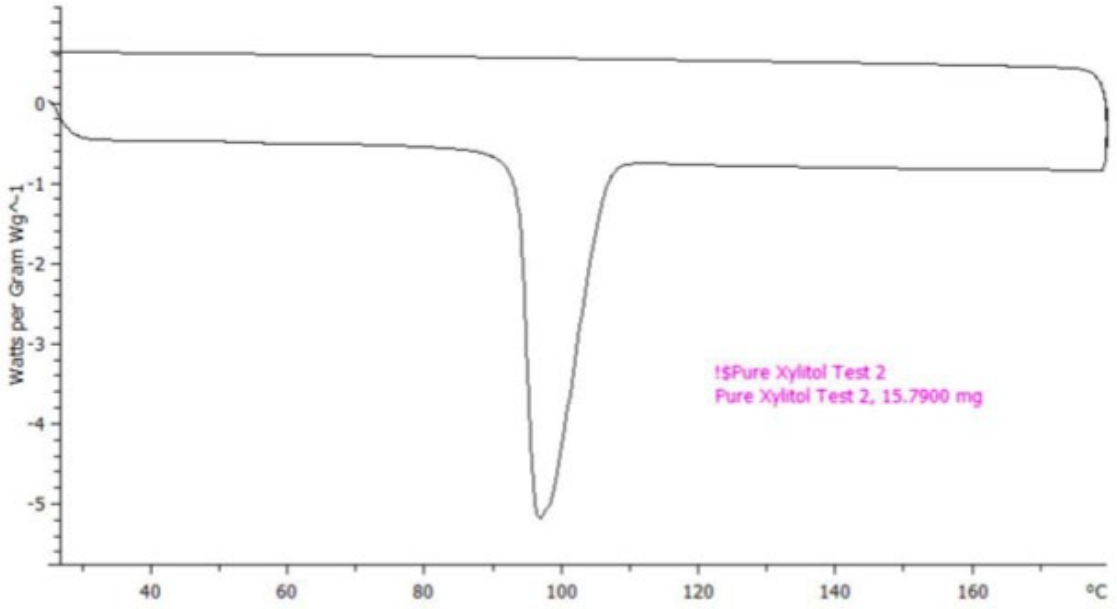

Fig. 20 shows the DSC graph of Xylitol

The DSC graph of xylitol shows the substance melting. However, it does not recrystallize to complete its phase transition. This is due to the PCM exhibiting supercooling, which means the sample cools past its fusion temperature while remaining in the liquid state. The DSC graph for erythritol shows the sample also experiences some supercooling, however crystallization still occurs. The DSC data imply xylitol should not replace erythritol as a good PCM.

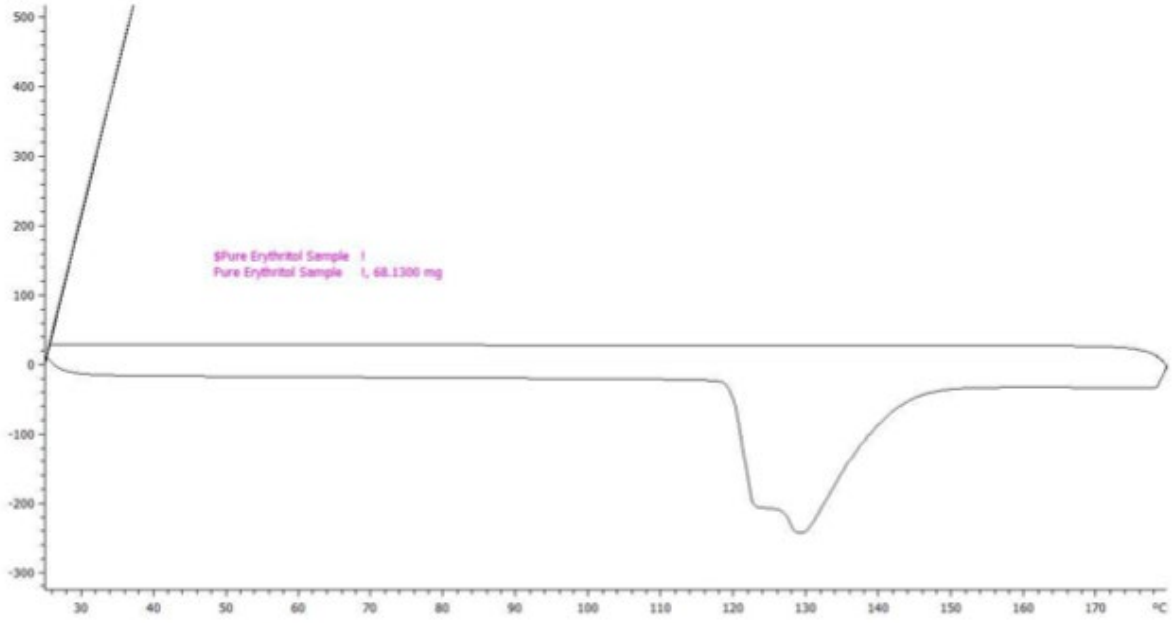

Fig. 21 shows the DSC graph of erythritol