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Title: Thermal Characterization of Salt Hydrate Phase Change Materials for Solar Thermal Storage

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Category: Alternative Energy & Sustainability

Phase change materials (PCM) are a widely studied method of storing thermal energy. They use latent heat associated with a phase change to store a much larger amount of heat in a smaller area than is possible using more conventional materials. Since a large fraction of energy consumed by Nova Scotians is in space heating it is desirable to offset this cost using solar energy. PCMs are an effective way of storing that solar energy.

This research focuses on a particular category of PCMs, salt hydrates. Some of the most promising aspects of salt hydrates are a very high latent heat and a relatively good thermal conductivity. However, in general, salt hydrates are plagued by two major problems. The problems are supercooling and poor cycle life.

In general, the data available on the thermal properties of salt hydrates are inconsistent and many materials are almost entirely unstudied. There are many reasons for the gaps and inconsistencies in the literature, but they can be partially attributed to the problems of supercooling and poor cycle life.

In an attempt to improve the literature, a group of less well studied salt hydrates with promising properties and melting points in the range useful for non-concentrating solar thermal energy were studied using both conventional highly accurate measurements and less conventional methods, with the aim to sidestep the aforementioned major problems. The results of the various methods are compared and the materials are assessed for their potential for further research or utilization.