Acronym
SAM.SSA

Full Title
Sugar Alcohol based Materials for Seasonal Storage Applications

Programme
ENERGY.2011.4.1-3: Materials for Advanced compact storage systems

Contract Number
296006

Abstract
The SAM.SSA project aims at developing new phase change materials (PCM) for thermal energy seasonal storage applications (STES) in the range of medium temperatures. The generated materials shall provide:
• Low cost, environmentally sound and safe solutions for seasonal storage applications
• Easy adjustment of the melting point for optimal ”tuning” to the required applications
• Energy densities > 200 kWh/m3 for compact storage
• Long-term storage with significant reduction of thermal losses
• Storage heat release at "high" temperature with reduced discharge power requirements
PCM are rarely proposed for STES due to i) insufficient energy densities and ii) the high risk of PCM solidification during the storage period caused by poor insulation inadequate for maintaining temperatures beyond the melting point. These problems will be overcome by the materials proposed in SAM.SSA.
SAM.SSA will develop molecular alloys based on sugar alcohols (MASA). These molecular alloys allow for adjustment of the melting point and lead to a significantly increased energy density compared not only to that of their components, but also to that of n-alkanes molecular alloys. Furthermore sugar alcohols permit high levels of undercooling thus minimizing the risk for spontaneous PCM solidification and at the same time reducing insulation requirements as well as thermal losses during long term storage. The application of a local thermal shock or ultrasound will induce nucleation and subsequent crystallization thus provoking easy discharge of the storage system.
Like most PCM, sugar alcohols due to their low thermal conductivity (typically < 1 W/m/K) impose a principal heat transfer problem on the storage design. SAM.SSA research will overcome this problem by increasing the MASA thermal conductivity using low-cost, tailor-made carbon porous structures, and increasing the specific area of heat exchange through MASA macro- or micro-encapsulation with organic, inorganic and hybrid shells.

Duration
36 months (01/04/2012 – 31/03/2015)

Project Funding
2,941,997 **€**

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