

NANOPCM GYPSUM COMPOSITE BOARD AS A SMART THERMAL ENERGY STORAGE FOR BUILDING

Patent No. PI2015000037



Fig. 1 NanoPCM



Fig. 2 NanoPCM gypsum composite board

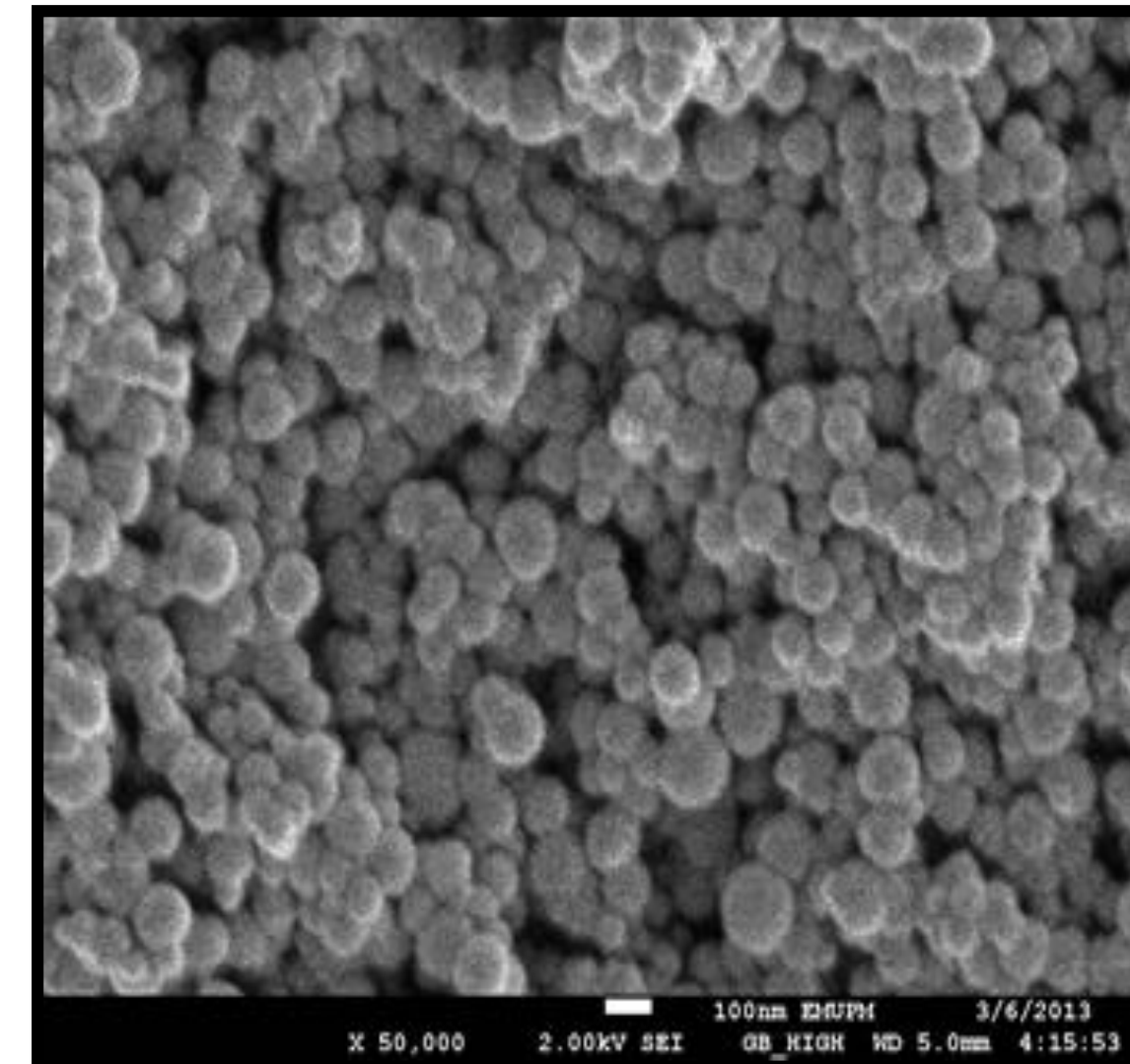


Fig. 3 FESEM image of NanoPCM

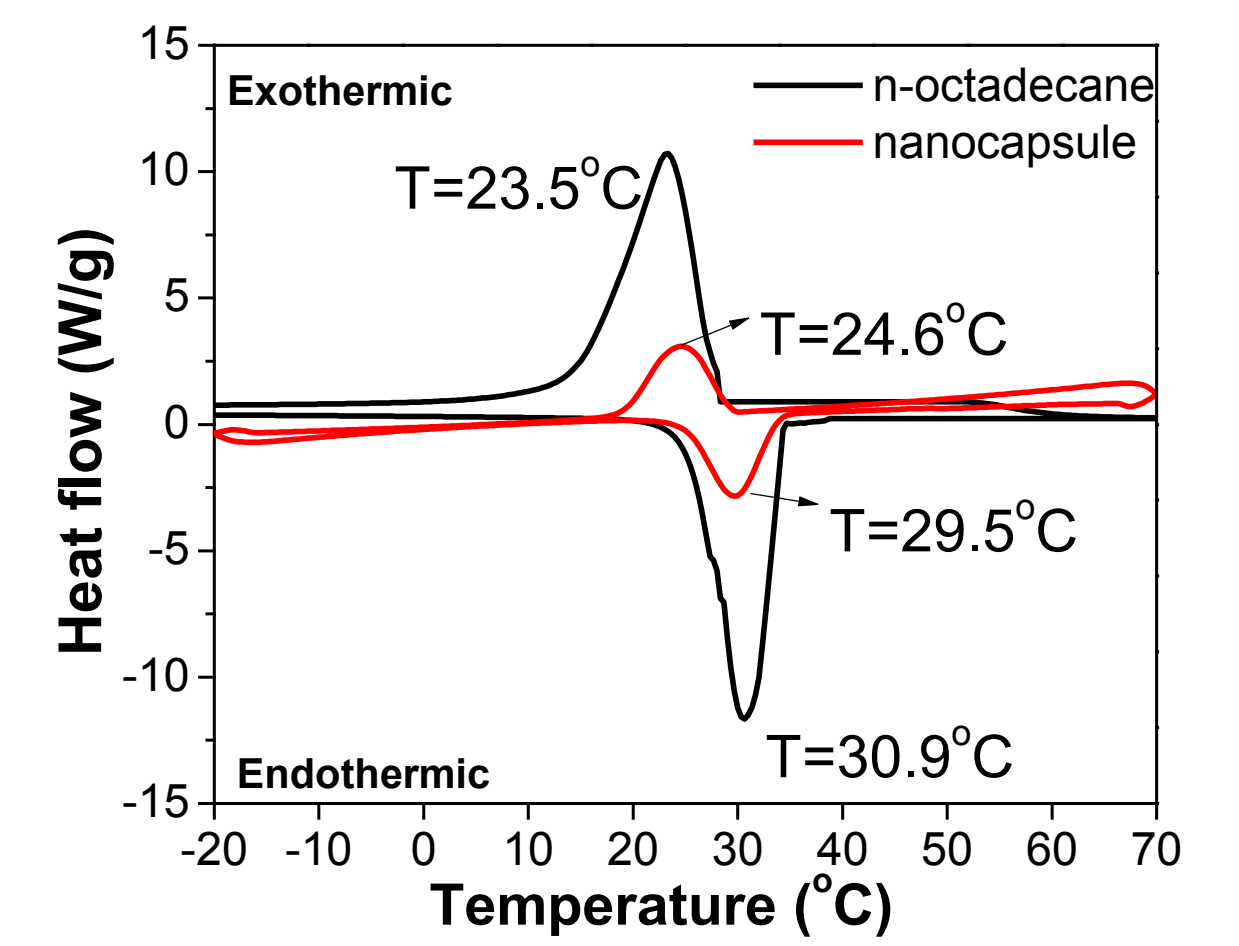


Fig. 4 DSC thermograms of NanoPCM

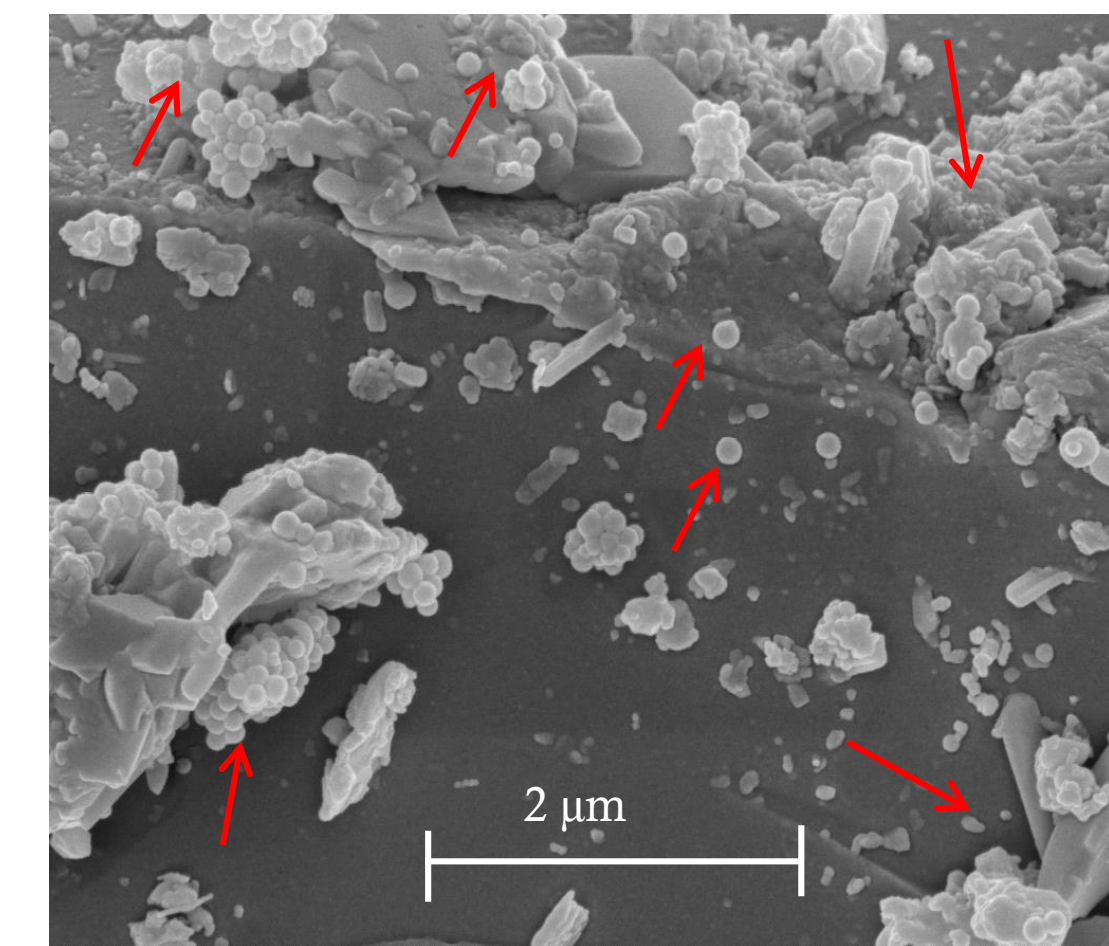


Fig. 5 FESEM image of a crushed NanoPCM gypsum composite board (arrow shows the NanoPCMs are still intact)

NEED

Buildings are responsible for 40% of the total world annual energy consumption, in which the large portion of energy is used for heating and cooling purposes. In addition, it is also responsible for green gas emission and depletion of conventional energy resources. Therefore, it is a great demand to develop building materials with improving energy efficiency, and at the same time has a capability to maintain the internal building comfort temperature, thus reduce the energy usage and indirectly could protect the environment from CO₂ emission.

APPROACH

- Incorporation of nanoPCM into gypsum for the fabrication of a NanoPCM gypsum composite board (NGCB) which can act as a smart passive thermal energy storage.
- The NGCB obtained has the ability to release, store and absorb thermal energy automatically depending on the surrounding temperature.
- This property could maintain the building comfort temperature by reducing the internal building temperature fluctuation, thus indirectly will reduce the energy usage.

BENEFIT

(i) Simple production method and easy to up-scale; (ii) The technology is currently not commercially available in Malaysia; (iii) The nanoPCM for thermal energy storage is superior compared to the commercially available microcapsules; more efficient heat transfer and more compatible with building material (iv) non-hazardous.

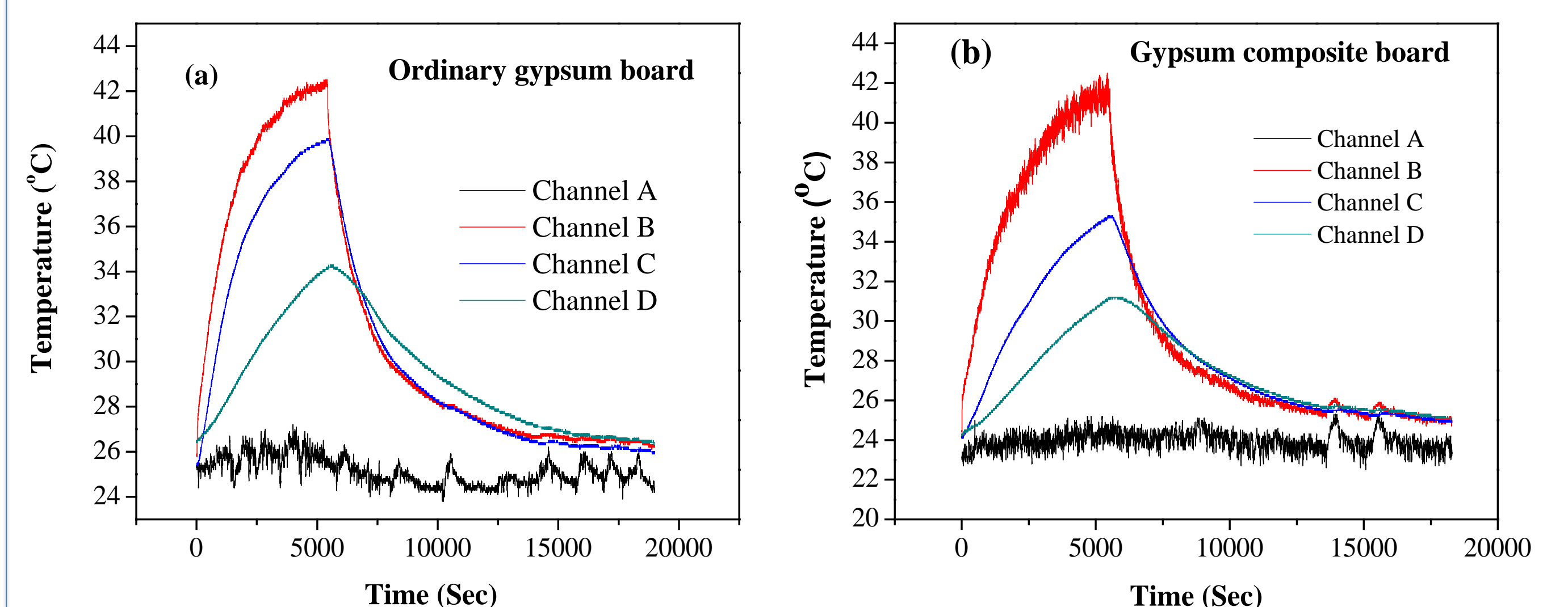


Fig. 6 Temperature profiles of (a) ordinary gypsum board and (b) gypsum composite board containing 5 % NanoPCM (Channel A: Laboratory environment; Channel B: external surface of the gypsum boards (outside wall); Channel C: inside wall of the gypsum board; Channel D: Indoors (center of the test room))

✓ NanoPCM has a capability to reduce the energy consumption by decreasing the indoor building temperature variation.

COMPETITOR/MARKET POTENTIAL

- The product has a great potential to be marketed all around the world as a component for comfort, green building materials, especially for countries with extreme climate.
- Consumers consciousness about the energy-saving and environmental-friendly energy technology is a driving force for the growth of the global PCM market.
- The PCM market is estimated to grow from USD 460 million in 2013 to USD 1150 million by 2018 (source: <http://www.marketsandmarkets.com>)

LASCOR ENERGY SOLUTIONS

UNDER NDA - COLLABORATION WITH LASCOR ENERGY SOLUTIONS (AUSTRALIA)



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