Qatar thermal energy storage

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Doha, Qatar: Center for Advanced Materials (CAM) at Qatar University (QU) is making significant strides in the development of innovative thermal energy storage materials, commonly known as phase change materials (PCMs), led by Dr. Igor Krupa, a distinguished research professor.

Such harsh conditions lead to substantial energy consumption, especially for air conditioning, with buildings accounting for over 40% of global energy use. To address this challenge, CAM is dedicated to developing bioclimatic buildings that leverage local climate conditions and utilise energy from the environment, particularly the sun.

"The key to achieving sustainable energy management lies in our ability to effectively absorb and release thermal energy from the sun, minimising the reliance on electrical energy," explained Dr. Krupa. "By developing specialised Phase Change Materials, we can optimise thermal comfort while significantly reducing energy consumption in both cooling and heating processes."

PCMs are a class of materials that undergo a phase transition between solid and liquid states at specific temperatures, enabling them to absorb or release large amounts of thermal energy. The specific enthalpy of melting determines the amount of energy absorbed or released during the phase transition. CAM"s research primarily focuses on polymeric PCMs, which utilise materials such as plastics (including polyethylene and polyethylene waste) and paraffin wax.

Over the past decade, CAM has been at the forefront of thermal storage system research, resulting in numerous published papers and a patented technology. CAM has developed PCM materials in the form of blocks and foams. One notable breakthrough is the creation of foams from polyethylene/paraffin wax blends, which have been patented as insulating plastic foams based on polyolefin (US2018/0291166A1). Foamed PCMs serve a dual purpose as effective heat absorbers and thermal insulators, offering superior heat protection for buildings against overheating.

"With our research and development efforts, we aim to facilitate all-season feasible farming in greenhouses by implementing efficient cooling and heating strategies," stated Dr. Krupa. "Our goal is to contribute to energy saving and promote sustainable agricultural practices in Qatar."

The main challenge in implementing these thermal storage systems on a larger scale lies in the production of final sheets weighing several tons. However, CAM, in collaboration with its partners, is actively working on developing techniques for large-scale production to meet industry demands. Dr. Krupa and his team"s pioneering work in the field of thermal energy storage materials holds great promise for the efficient management of energy in bioclimatic buildings and greenhouses.

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The Centre for Advanced Materials (CAM) at Qatar University (QU) is making significant strides in the development of innovative thermal energy storage materials, commonly known as phase change materials (PCMs).

Led by distinguished Research Professor Dr. Igor Krupa, the team at CAM is revolutionising energy management in bioclimatic buildings and greenhouses by harnessing the power of these advanced materials.

Qataru2019s climate is characterised by extreme temperatures, reaching up to 45u00b0C in the scorching summer and dropping as low as 5u00b0C in the short winter. Such harsh conditions lead to substantial energy consumption, especially for air conditioning, with buildings accounting for over 40% of global energy use. To address this challenge, CAM is dedicated to developing bioclimatic buildings that leverage local climate conditions and utilise energy from the environment, particularly the sun.

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