

## Development and Characterization of a Bio-Sourced Composite Material Based on Phase Change Material and Hemp Shives

**Authors :** Hachmi Toifane, Pierre Tittlein, Anh Dung Tran Le, Laurent Zalewski

**Abstract :** This study introduces a composite material composed of bio-sourced phase-change material (PCM) of plant origin combined with hemp shives, developed in response to environmental challenges in the construction sector. The state of the art emphasizes the low thermal storage capacity of bio-based materials and highlights increasing need for developing sustainable materials that offer optimal thermal, mechanical, and hydric performances. The combining of PCM's thermal properties and hygric properties of hemp shives results in a material that combines lightness, strength, and hygrothermal regulation. Various formulations are being assessed and compared to conventional hemp concrete. Thermal characterization includes the measurements of thermal conductivity and numerical simulations to evaluate the thermal storage capacity. The results indicate that the addition of PCM significantly enhances the material's thermal storage capacity, positioning this one as a promising, eco-friendly solution for sustainable construction and for improving the energy efficiency of buildings.

**Keywords :** hemp composite, bio-sourced phase change material, thermal storage, hemp shives

**Conference Title :** ICBBM 2024 : International Conference on Biobased Building Materials

**Conference Location :** Rome, Italy

**Conference Dates :** September 12-13, 2024