

## Waste-based Porous Geopolymers to Regulate the Temperature and Humidity Fluctuations Inside Buildings

**Authors :** Joao A. Labrincha, Rui M. Novais, L. Senff, J. Carvalheiras

**Abstract :** The development of multifunctional materials to tackle the energy consumption and improve the hygrothermal performance of buildings is very relevant. This work reports the development of porous geopolymers or bi-layered composites, composed by a highly porous top-layer and a dense bottom-layer, showing high ability to reduce the temperature swings inside buildings and simultaneously buffer the humidity levels. The use of phase change materials (PCM) strongly reduces the indoor thermal fluctuation (up to 5 °C). The potential to modulate indoor humidity is demonstrated by the very high practical MBV (2.71 g/m<sup>2</sup> Δ%HR). Since geopolymer matrixes are produced from wastes (biomass fly ash, red mud) the developed solutions contribute to sustainable and energy efficient and healthy building.

**Keywords :** waste-based geopolymers, thermal insulation, temperature regulation, moisture buffer

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