FKKT | UNIVERZA V LJUBLJANI
Fakulteta za kemijo in kemijsko tehnologijo

VABILO NA PREDAVANJE
V OKVIRU DOKTORSKEGA ŠTUDIJA
KEMIJSKE ZNANOSTI / INVITATION TO THE
LECTURE WITHIN DOCTORAL PROGRAMME IN
CHEMICAL SCIENCES

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z naslovom / title:

Development of Building Materials Containing Phase Change Materials for Energy Savings

v sredo, 12. 11. 2025 ob 15. uri
v predavalnici 1 v 1. nadstropju Fakultete za kemijo in kemijsko tehnologijo, Večna pot 113 ***/***
on Wednesday, 12. 11. 2025 at 15.00
in lecture room 1, 1st floor at the Faculty of Chemistry and Chemical Technology, Večna pot 113

Vljudno vabljeni! / Kindly invited!

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Abstract:
The depletion of non-renewable resources and global warming require a shift towards sustainable energy [1,2]. Green energy sources, advanced technologies to increase energy system efficiency, and sustainable energy sources are reducing global dependence on fossil fuels [3]. The growing interest in developing and utilising effective thermal energy transport methods has made it possible to use renewable energy sources (such as solar energy) more efficiently and extensively [4]. There are different methods for thermal energy storage, including thermochemical, sensible heat, and latent heat storage [5]. Phase change materials (PCMs) are materials that absorb and release energy during phase transition cycles, resulting in a reversible energy material [6]. The use of latent heat thermal energy storage (LHTES) enables high energy storage density within a narrow operating temperature range [2]. For solid-liquid state change, the drawback of PCMs is its leakage in the liquid state, which can be avoided by PCMs microencapsulation using a polymeric shell. While microencapsulated PCMs (MPCMs) are mostly used in passive systems, nanoencapsulated PCMs (NPCMs) are increasingly in demand for active systems [7,8]. Building materials such as gypsum, polyurethane (PU) foams, and mortars can be modified with PCMs, improving their thermal energy storage (TES) capacity. For applicability, it is important to consider the mechanical strength, fire-retardant properties, and long-term thermal stability of PCMs. The TES capacity of foams containing 25 wt.% of MPCMs was 1.43 K kWh/m^3, representing an increase of 150 % compared to the standard with the same thermal conductivity (0.048 W/m·ºC) [9]. Gypsums containing 15 wt.% of MPCMs as fillers improved their TES capacity by 66.3 %, increasing from 6.13 to 10.20 kWh/m^3. The thermal conductivity of these materials (0.261 W/m ºC) was 18.41 % lower than the standard [10,11]. Finally, the TES capacity of bricks increased by up to 330 %, reaching 8.14 kWh/m^3 with a thermal conductivity of 0.280 W/m ºC [12].

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