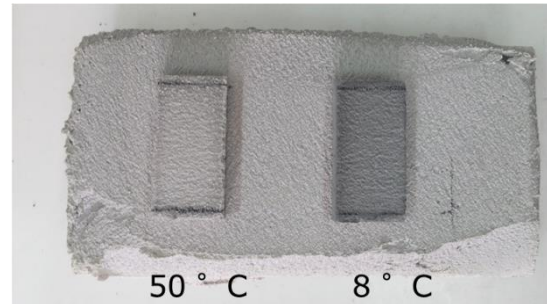


Bachelor- /Masterarbeit Vanadium leaching from thermochromic mortar

Vanadium dioxide (VO_2) is a **thermochromic material** that changes its optical response as a function of **temperature**. This property makes it very attractive for applications related to the thermal adaption of buildings. Up to now developments in this area have mostly focused on smart windows and glazing. Recently a new approach related to the use of VO_2 in cement-based materials for adaptive **building envelopes** has been proposed (1,2). The material should help cooling the building at high temperatures and heating it at low temperatures, with the subsequent **energy savings**.



In order to assess the suitability of the materials for specific environments, optical, mechanical and chemical properties need to be determined. The possible **leaching** of the VO_2 embedded in the cementitious matrix is one of the main concerns related to the exposure to rain.

In this project the cement-based samples containing VO_2 will be prepared and the **hydration** properties will be assessed by means of **Isothermal Calorimetry**. The samples will then be immersed in water and the concentration of vanadium in the solution will be measured as a function of time by means of inductively coupled plasma optical emission spectroscopy (**ICP-OES**). The leaching behavior together with the hydration properties should allow for an understanding of the **binding mechanisms and stability of VO_2 in cement matrices**.

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References:

(1) *Smart reversible thermochromic mortar for improvement of energy efficiency in buildings*, G. Perez et al, *Cons. Build. Mat.* 186 (2018)

(2) *Selection of suitable materials for the development of an innovative thermochromic Trombe wall*, G. Perez et al, *Adv. Buil. Ener. Res.* (2019)