29 JUNE - 3 JULY
ACEX2026
RHODES · GREECE
19th International Conference on Advanced
Computational Engineering and Experimenting
29 JUNE – 3 JULY 2026 | RHODES, GREECE

ABSTRACT:

Reactive Cementitious Rubber Composites for Water Swellable Seals

Agathe Robisson
Faculty of Civil and Environmental Engineering, Institute of Material Technology, Building Physics, and Building Ecology, TU Wien, Vienna, Austria, European Union

In this work, we describe the behavior of composites, made of cement grains embedded in an elastomeric matrix, upon exposure to water. Such composites are able to undergo significant swelling (ca. 100 v%) upon exposure to water. Simultaneously, their Young's modulus also increases. This contrasts with hydrogels, whose stiffness drops considerably upon swelling. This unique response is attributed to the hydration of the cement grains within the rubber matrix, and makes this new material an outstanding candidate for industrial sealing applications in wet environments, with low cost manufacturing.
We will focus on the kinetics of water diffusion and cement hydration within the elastomeric matrix, and the resulting evolution of mechanical properties with time. We will also describe the development of microstructural heterogeneities within the composite. If time allows, we plan to give some insight into the industrial process of developing and commercializing a novel swellable seal, and add a personal perspective.

Keywords: seal, rubber, cement, self-actuation, commercialization