

Hydrophobic mortar

Reference No: B75015

CHALLENGE

The durability of **cement-based materials** such as **mortar** and **concrete** typically suffers from water penetration, resulting in **corrosion** of steel structures embedded inside the material, and therefore to damage and weakness of the building structure.

INNOVATION

Here a **mortar hybrid** material is presented where a **bacterial biofilm** is supplemented, **increasing the hydrophobic properties**. Bacterial biofilms are ubiquitous communities of bacteria encased in a matrix of self-produced biopolymers. In such a biofilm matrix, the bacteria are able to resist various environmental challenges, e.g., chemicals, desiccation, or removal from surfaces. With this addition of biofilm to mortar, the material exhibits an **increased roughness on the microscale and the nanoscale**, and on both the outer and inner surface, **imitating the lotus effect** (see Figure below).

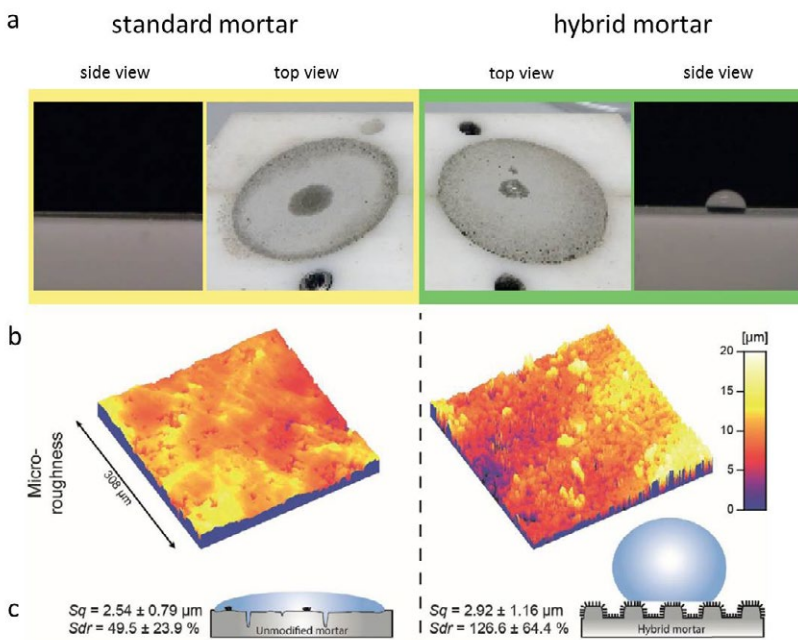


Figure: The hybrid mortar exhibits increased micro- and nano-roughness. a) Wetting behavior of a water drop on unmodified mortar and biofilm-enriched hybrid mortar. b) light profilometry images. bc - biofilm content, wc - water/cement ratio. Sq values represent the root-mean-square roughness of the samples and Sdr values the developed interfacial area ratio. c) A schematic of the topological changes responsible for the increased wetting resistance of hybrid mortar.

COMMERCIAL OPPORTUNITIES

Biofilm-enriched hybrid mortar

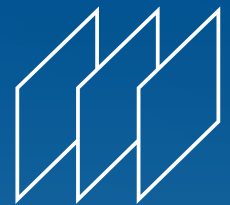
- with strong hydrophobic properties
- with no need for post-treatment
- that is not harmful to the environment

DEVELOPMENT STATUS

- biofilm-enriched hybrid mortar has been tested and analyzed on laboratory scale
- lyophilized powder of the bacterial biofilm available as dry admixture
- mechanical properties with different amounts of biofilm contents have been measured

REFERENCES:

- 1 Grumbein et al., AdvMat 28 (37), 2016, 8138-8143
- 2 <http://www.3sat.de/mediathek/?mode=play&obj=62156>



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