



Influence of mafic nano-additives on lime-based renders

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The development of environmentally friendly composites using waste materials and low-cost rocks as additives could help reduce the anthropogenic impact on the environment. This study, which is co-funded by the Republic of Cyprus and the European Committee through the Cyprus Research Promotion Foundation (Project KOINA/M-ERA.NET/0316/04) and Hungary through the National Research, Development and Innovation Office (Project NKFI/M-ERA.NET2/127023), focuses on the performance of lime-based renders modified by the addition of two types of nano-structured mafic rocks. A dolerite quarry waste and an olivine basalt, from the Troodos ophiolite complex (Cyprus), were initially wet-milled with a lab-scale planetary ball mill in order to produce nano-structured mafic powders. Both materials were then added individually to hydrated lime-based composites at 5% w/w as a replacement of the binder and the end-products were thoroughly characterised in the laboratory. Apart from the nano-modified composites, reference specimens were also prepared for comparison purposes. The experimental results revealed that both nano-additives result in renders with a denser microstructure due to the nano-filler effect, in combination with the enhancement of carbonation and pozzolanic reactions. However, a number of differences were also observed in the performance of the end-products; these are attributed to the distinct mineralogical composition of the two mafic rocks. Despite the energy required to produce ultrafine powders, the results suggest that this approach could have a great positive impact on the building industry upon commercialization, taking into account the worldwide abundance of similar mafic lithologies and the operation of respective quarries around the globe.