Magnesium oxysulfate cement for reef starter structures

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Magnesia cementitious materials have gained attention in recent years as substitutes to Portland cement with potential environmental benefits. Within this family of binders, magnesium oxysulfate (MOS) cement exhibits promising mechanical properties and durability in water. Our work aims at developing a carbon-negative MOS cement to build reef starter structures for shore protection and at tailoring the formulation to meet the following targets: biocompatibility, durability in seawater, and mechanical strength. To optimize the properties of the MOS cement formulation, our approach is the use of additives (metakaolin, sulfuric acid, phosphoric acid, and ammonium chloride) at different proportions. Preliminary results show that the setting time of MOS cements is short (less than 10 min) and that this time can be controlled by varying the mass proportions of magnesium oxide, magnesium sulfate, metakaolin, and the acids.