

Engineered uses of nanomaterials for sustainable cementitious composites

Abstract

Over several decades ago, the use of nanomaterials has become attractive, as it has provided solutions to numerous engineering problems. For instance, biomaterials (optoelectrical materials, tissue-engineering scaffolds, and supercapacitors), have been developed from algal cells, which are subsequently used in medicine, heavy metal absorbents, and biosensors. In this chapter, the various engineered uses of nanomaterials for sustainable cementitious composites are reported. Emphasis was laid on to nanomaterials uses in the construction field, with a holistic view of types and specific applications. Nanotechnology has brought significant development to the construction field. Nanomaterials, such as ureolytic or nonureolytic bacteria and nano-silica, are used for modifying the interfacial transition zone of recycled aggregate and recycled aggregate concrete. Such modifications influence a reduction in water permeability of the composite matrix and also enhance the specific gravity of aggregates. By this technology, microscale features of cementitious composites are also modified. The hydration mechanism is improved with biogenic calcite. Nanoengineered cementitious composites, having appreciable mechanical and durability characteristics, have been developed using this technology.

Keywords Nanomaterials Nano waste management Sustainability Biogenic materials Hydration mechanism Cementitious composite