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Performant cement based materials reinforced with nano-SiO₂**Mihaela-Andreea Moncea, Florina-Diana Dumitru, Marius Viorel Olteanu, Madalina Boboc and Gyorgy Deak**

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The paper presents the investigation of the effect of SiO₂ nanoparticles on the mechanical properties and microstructure of cement based materials. For this purpose nano-SiO₂ powders were obtained by sol-gel method using different molar ratios of TEOS/ethanol/water. The formation of nano-SiO₂ particles was confirmed by X-ray fluorescence analyses (XRF) and the nanometric sizes by scanning electron microscopy (SEM). The cement based materials admixture were obtained by using 0.45 and 0.5 water/binder ratio (w/b) and for each ratio the cement was substituted with 0.5 of 0.7% of nano-SiO₂. The distribution of nano-SiO₂ particles within the cement matrix plays an essential role and governs the performance of these products. Therefore, the addition of 0.4% super-plasticizer for the w/b=0.45 was proposed to facilitate the distribution of nano-SiO₂ particles. The mechanical test results showed that after 7 days of hydration the cement based materials with 0.7% nano-SiO₂ content improved the compressive strengths compared with those of the etalon (E=45MPa Vs. AM1=55MPa). The microstructure of cement based admixtures highlighted the presence of Ca(OH)₂, ettringite and calcium silicate hydrates as well as nano-SiO₂ particles embedded into the cement matrix.

Biography

Mihaela-Andreea Moncea has completed her PhD from Politehnica University of Bucharest. She is a Senior Researcher at the National Institute for research and development in environmental protection, within the impact of built environment and Nano-materials Department. She has published more than 30 papers and is serving as Reviewer of specialized ISI journal in the materials science field.

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