A new formulation for strength characteristics of steel slag aggregate concrete using an artificial intelligence-based approach

Paul O. Awoyera, Iman Mansouri, Ajith Abraham and Amelec Viloria

Abstract

Studies examining nanoparticles (NPs) and hazardous elements (HEs) contained in suspended sediments (SSs) are vital for watershed administration and ecological impact evaluation. The biochemical consequence of titanium-nanoparticles (Ti-NPs) from SSs in Colombia's Magdalena River was examined utilizing an innovative approach involving nanogeochemistry in this study. In general, the toxicity and the human health risk assessment associated with the presence of some Ti-NPs + HEs in SSs from riverine systems need to be determined with a robust analytical procedure. The mode of occurrence of Ti-NPs, total Ti and other elements contained within SSs of the Magdalena River were evaluated through advanced electron microscopy (field emission scanning electron microscope-FE-SEM and high resolution transmission electron microscope-HR-TEM) coupled with an energy dispersive X-ray microanalysis system (EDS); X-Ray Diffractions (XRD); and inductively coupled plasma-mass pectrometry (ICP-MS). This work showed that enormous quantities of Ti-NPs were present in the river studied and that they displayed diverse eochemical properties and posed various possible ecological dangers. Ti-NP contamination indices must be established for measuring the environmental magnitudes of NP contamination and determining contamination rank among rivers. Finally, SS contamination guidelines must be recommended on an international level. This study contributes to the scientific understanding of the relationship of HE and Ti-NP dynamics from SSs in riverine systems around the world.

Key Words