

SELF-REGULATING “SMART” CONCRETES: A NEW PARADIGM OF CONCRETE SCIENCE

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ABSTRACT

Modern construction is unimaginable without concrete, the global production and consumption of which is about 10 billion m³ per year. Humanity is entering a new paradigm. Existing approaches to ensuring the sustainable development of construction based on structural concrete are clearly insufficient. Intensive innovative work is currently going on to create new concretes with various new functional requirements, and new technologies to reduce the construction cycle and save labor, increase durability, improve the efficiency of structures, and ensure environmental friendliness. Self-regulating “smart” concretes are one of the most in-demand subjects and paradigm of modern concrete science today. Nowadays, one can already state the successful implementation of wide range of such concrete including self-compacting concretes, self-healing concretes, self-stressed concretes and concretes with compensated shrinkage, strain-hardening cement-based composites, self-cleaning concretes, biomimetic technologies that reproduce the systems and processes of living nature in the form of technical and technological systems, and many others. Additive technologies, including 3D printing, production of photochromic and transparent concretes, are becoming increasingly important. Self-regulating “smart” concretes most fully embody the latest advances in concrete technology and open up new paths for the development of concrete science as a fundamental section of materials science.

Keywords: self-regulating concretes; ‘smart’ concretes; paradigm; concrete science.

Presenter



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Life Member. RILEM National Delegate, RILEM Honorary Member. Vice-President of ACF, ACF Fellow. Member of ACI. Expert of the International Organization for Standardization (ISO).

The author more than 420 research papers and 70 patents. The Russian Federation Government Prize winner in the field of science and technology. Holder of the Order "Engineering Glory". The Honorary Builder of Russia.

Research interests: problems of concrete durability; sustainability; chemical admixtures for concrete and mortars; special binders and concrete; nanotechnologies in construction.