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Application of Nanomaterials in Architecture

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ABSTRACT

This article examines the prospects of development as a new innovative technology-building nano materials-in construction and architecture, which use heavy-duty and light construction materials and technologies, as well as the development of new trends in the areas of nanotechnology for use in architecture.

At the present stage, the discovery of carbon nanotubes, which marked the beginning of a new generation of heavy-duty and lightweight building materials, which in turn revolutionized architecture. Carbonunder the influence of high temperature and pressure in the earth's interior compresses andforms a diamond crystal, which is the most durable natural material on earth, but basically, most of the carbon exists on the planet in the form of graphite. Before the discovery of nanotubes, it was thought that graphite and diamond were the two and only forms of pure carbon on the planet, but recently another form was found in the form of a microscopic plate of graphite rolled into a cylinder in the form of a tube. A carbon atom connected to three neighboring atoms forms a new microscopic layer, which, under certain conditions, is able to collapse into a seamless cylinder, into an elastic and strong connection-a nanotube.

Steel, ceramics, plastic and other materials joined or reinforced with nanotubes form a new generation of building materials with truly fantastic properties. When certain conditions are created, carbon is able to form itself and even recover into cylindrical tubes, so that it does not even need to be produced, it is possible that carbon can create not only an incredibly strong connection, but also an ever-recovering material, in addition, a nanotube can take any shape.The carbon nanotube has already revolutionized architecture. Nanotechnology in architecture will open up a new world for humanity, different from all the previous ones. Carbon architecture will finally be freed from the traditional idea of human habitation in the space of a right angle, it will require different approaches, it will be characterized by such concepts as virtuality, fluidity, interactivity, parametric design, from which a new one comes.

the style*is parametric*, born from digital animation techniques. Architecture will follow the path of transforming geometry, creating chain structures, biological forms, and fluid interactive spaces. Nanotechnological architectural forms and traditional pre-nanotechnological geometric

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forms of architecture will represent two cultural eras of human habitation on the planet, and what became possible in the construction of the XIXcentury was born only under the influence of big science. They are practical and very beautiful, they encode one of the most important creative potentials of nanotechnology, and previously no one has ever encroached on this.

The material of the enclosing structures of the church has a striking property Divesign ин Misericordia ("The Generous One in Mercy") in Rome, which is the ability to self-clean, without human intervention. All pre-nanotechnological buildings are decaying and aging under the influence of the environment. Monuments are being destroyed, they are disappearing, and they must be preserved, preserved, restored, and the buildings where we live and work must be constantly repaired. The church of Centro Techniso di Gruppo, built in 2003 by an Italian construction company and designed by American designer Richard Meyer, demonstrates new technologies in the wall panels, and as the author himself puts it, preserves the divine purity. The specialists used cement made by them using a new technology - TH Astiv®, which includes nanoparticles of titanium dioxide (TiO2).Titanium dioxide nanoparticles provide the dazzling whiteness of the Church of Dives in Miserisordia in Rome**.** Thanks to photocatalysis, the surface of the material can clean itself as soon as the sun's rays touch the walls of the building, titanium dioxide, which is part of them, acts as a catalyst and accelerates the chemical reaction. Pollution of various kinds — bacteria, bacterial spores, mold, which cover the walls of any building, just decompose into water, oxygen and salt, and cement with nanoparticles washes itself. The church, built of white concrete and glass, literally "glows" against the background of the surrounding traditional buildings of the 1970s. New building materials helped bring to life Richard Meyer's vision, where light is the means by which we are able to experience what is called the divine. Nanotubes of titanium dioxide are used in the concrete slabs of the Holocaust memorial in Berlin, in the glass dome of the Grand National Theater in Beijing (architect Paul Andre), which is covered with a self-cleaning film, and in other structures. The glass surface of the dome of the Grand National Theater in Beijing is always transparent, as it is covered with a thin film oftitanium dioxideкатализатораof the THIO2 catalyst, thanks to which, under the action of photocatalysis, the dome is self-cleaning. Cultural and entertainment center in Astana "Khan Shatyr" has a transparent plastic coating, thanks to which the interior of the building is always the same temperature, daylight, and the surface is always clean. To cool the building in the summer, the designers have provided a special film that will hide the transparent arches in the heat. "Khan Shatyr" is a modern interpretation of the architecture of mobile, mobile housing-yurts, tents, canopies of the nomadic Kazakh people, but in a stationary form. The cable-stayed covering of the Khan Tent consists of many thin cables and fine mesh, covered with an ultralight canvas – a new unique material, ETFE fluoropolymer, that allows light to pass through and protects the interiorspace from heat and cold.

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