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Consiglia Mocerino

Sapienza University of Rome-MIUR, Italy

Sustainability of nanomaterials in architecture

The nanomaterials that represent the technological innovation in the building industry are in a growing development, based above all on high performances of environmental sustainability and safety for managers and workers in the building sector and for end users. Hence, new nanomaterials in architectures, such as in IT, electronics, healthcare, textiles, design, etc., are launched by improving chain production, with low environmental impact, for the protection of human health, excluding the possible risk of their probable toxicity—the identified toxicity and exposure identified in both humans and the environment. They are defined by the EU recommendation (2011/696/EU), adopted by REACH for registration, evaluation, authorization, restriction of chemicals and by CDL for classification and labeling as, "a natural, accidental or manufactured material containing free, aggregate or agglomerated particles in which, for 50% or more of the particles in the numerical dimensional distribution, where one or more external dimensions are in the range of dimensions 1 nm: 100 nm". This promising sector of the economy has become one of the strongest themes for studies and research, for universities, R&D, FIEC and FETBB and for national and international debates paying attention, mainly, to the chemical analysis and their life cycle up to the recycling of waste, to the awareness of the use and of useful instruments with necessary measures to be adopted. In fact, the physico-chemical properties of engineered or synthetic particles can differ from those of soluble and insoluble type, indicating the latter, and the most interested in the use of nanotechnologies and among the most susceptible to thermal effects, while focusing research on soluble particles, despite their easy dispersion in the environment. Therefore, objectives of conformity of the use of nanomaterials in different contexts with sustainable criteria for the environment and for human health, with improvement of production, safety and conscious application. Hence, strategies for monitoring and use of imaging techniques with application of ECHA, EUON Observatory with NanoData and NanoMapper, etc. The methodologies indicate the application of materials enhanced by nanoparticles such as self-cleaning cements with the ability to absorb CO₂ emissions, ceramics, coatings, insulators, etc. The challenge in architecture is the improvement with conscious use of the materials we have designed in all the components of the building and the implementation of testing their technical performances.

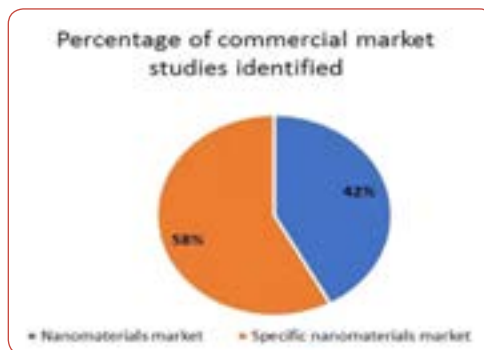


Figure 1: Percentage of commercial markets identified. Specific nanomaterials markets: Complex-Oxide Nanomaterials, Market- Graphene, Carbon nanomaterials or carbon nanotubes, Nanosilver, Nanocellulose, Nanoclay. Source: critical review of market studies nanomaterials final report en.pdf. ECHA-EUON, 2018

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Recent Publications

1. Mocerino C (2017) Sustainable identities in the technological esprit of architecture. Journal of Civil Engineering and Architecture (JCEA) 11(7):1934–7367.
2. Mocerino C (2017) Interoperable process: efficient systems in new constructive and product performances. Journal of Civil Engineering and Architecture (JCEA) 11(5):1934–7367.
3. Mocerino C (2016) Integration of the energy and building technologies. Journal of Civil Engineering and Architecture (JCEA) 10(12):1934–7367.
4. Mocerino C (2016) Technology innovation in digital architecture processes. Journal of Civil Engineering and Architecture (JCEA) 10(8):1934–7367.

Biography

Consiglia Mocerino graduated Cum Laude with a Master of Science Degree in Architecture, PhD in Urban Recovery and Regeneration and is a Specialist in Restoration of Monuments. She has held teaching, research collaboration and teaching assignments, as a Contract Professor, in Architectural at the Faculty of Architecture, Sapienza University of Rome. In the same faculty she obtained the nomination of Expert (3rd Member of the Examining Commission), in the discipline of Technology of Architecture and Industrial Design. She is an Expert in research on issues related to innovation and technological experimentation of systems and products in efficient, intelligent, low impact, environmentally friendly architectures, innovative materials and the application of third generation nanotechnology, IT, and intelligent robot in architecture. Her research interests include innovation and technological experimentation of systems and products in efficient, intelligent, low impact, environmentally friendly architectures, innovative materials and the application of third generation nanotechnologies, IT, and intelligent robot in architecture.

l.mocerino12@gmail.com

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