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Advanced Materials and Technologies for Smart and Sustainable Buildings

https://marketpublishers.com/r/AE9A5FFBD629EN.html
Date: April 2021
Pages: 450
Price: US$ 2,100.00 (Single User License)
ID: AE9A5FFBD629EN

Abstracts

Due to evolving standards for building regulations and demand for occupant comfort, the performance of building envelopes continues to improve. Buildings account for ~30-40% of the world's total primary energy, and the benefits of energy efficient buildings are numerous, from better thermal comfort to longer buildings lifecycle. In order to adhere to regulations, many new buildings are required to meet energy efficiency targets. These targets are increasingly met through technology, and in most cases rely on advanced materials, either by developing new materials or modifying existing ones.

The use of advanced materials, nanomaterials, and smart materials, is now driving improved building envelope performance by allowing reconciliation of the architectural features of buildings with the new challenges of energy and environmental efficiency. Technologies and materials include:

Smart glass and windows

Electrochromic (EC) smart glass

Thermochromic smart glass

Suspended particle device (SPD) smart glass

Polymer dispersed liquid crystal (PDLC) smart glass

Photochromic smart glass

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Micro-blinds

Electrokinetic glass

Graphene smart glass

Heat insulation solar glass (HISG)

Thermal and sound insulation

Vacuum Insulation Panels (VIP)

Aerogels

Transparent Insulation Materials (TIM)

Metamaterials

Graphene

Nanofiber?based insulation material

Shape memory sound absorption

Advanced construction materials

Advanced concrete additives

Graphene

Multi-walled carbon nanotubes (MWCNTs)

Single-walled carbon nanotubes (SWCNTs)

Cellulose nanofibers

Nanosilica

Nano-titania (TiO2)

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Zycosoil

Phase change materials

Self-healing materials

Self-sensing concrete

3D printing construction materials

Environment-adaptive skin facades

Memory steel

Biomaterials

Double-skin fa?ades

Vibration dampening

Passive vibration mitigation materials

Smart vibration mitigation materials

Metamaterials

Shape memory materials

Carbon nanotubes

Magnetorheological fluid (MRF)

Magnetostrictive materials

Smart coatings and films

Cool roofs

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Antireflective glazing

Metamaterials

Photocatalytic self-cleaning coatings

Hydrophobic coatings

Superhydrophobic surfaces

Anti-fouling and easy-to-clean coatings

Advanced antimicrobial coatings

Thermally insulating paint

Smart air filtration and HVAC

Nanofibers

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Metal-Organic Frameworks (MOF)

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Nano-TiO2 photocatalyst filter coatings

Self-healing coatings

Heating and energy efficiency

Metal-Organic Frameworks (MOF)

Phase change materials

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Energy harvesting

Piezoelectric materials

Thermoelectric materials

Building Integrated Photovoltaics (BIPV)

Bioadaptive glazing

Smart sensors

Temperature sensors

Motion sensors

Humidity sensors

Sensors for air quality

CO2 sensors for energy efficient buildings

Smart lighting

LEDs

Organic LEDs (OLEDs)

Quantum dots

Flexible lighting

Report contents include:

Market drivers for advanced materials in smart and sustainable buildings.

Revenues for smart and advanced materials building applications and markets.

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In-depth technology analysis.

In depth market analysis.

Profiles of over 210 companies in the smart and sustainable buildings market. Companies profiled include View, Inc., ChromoGenics AB, RavenWindow, Research Frontiers, Inc., Aerogel Technologies LLC, Blueshift Materials, Inc., Aspen Aerogels, Inc., Acoustic Metamaterials Group Limited, Carbon Upcycling Technologies, re-fer AG, Awaji Materia Co., Ltd., Phononic Vibes, Croda, HeatVentors, Solaxess SA and many more.

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