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The Global Market for Shape Memory Materials 2023-2033

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Abstracts

Shape memory materials are a widely-investigated class of smart materials capable of changing from one predetermined shape to another in response to a stimulus. The demand for structures capable of autonomously adapting their shape according to specific varying conditions has led to the development of shape memory materials such as Shape Memory Alloys (SMA) and Shape Memory Polymers (SMP).

Shape Memory Alloys (SMA) are able to recover their initial shape after a deformation has occurred, when subjected to particular thermal conditions. They possess superelastic behavior, which allows large deformations with limited or no residual strain, and a high power-to-weight ratio. Other properties include biocompatibility, high corrosion resistance, high wear resistance and high anti-fatigue.

SMAs are used in couplings, actuators and smart materials and are particularly suitable for adaptive structures in electrical components, construction, robotics, aerospace and automotive industries. Systems based on SMA actuators are already in use in valves and drives, where they offer lightweight, solid state options to habitual actuators such as hydraulic, pneumatic and motor based systems.

SMA are used in many other applications such as medical, controllers for hot water valves in showers, petroleum industry, vibration dampers, ball bearings, sensors, miniature grippers, micro valves, pumps, landing gears, eye glass frames, material for helicopter blades, sprinklers in fine alarm systems, packaging devices for electronic materials, dental materials, etc. Cambridge Mechatronics Ltd (CML) Shape Memory Alloy (SMA) actuator is being utilized in Xiaomi’s newly launched foldable handset, the Mix Fold 2. The medical market for NiTinol is a multi-million dollar market.

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Shape memory polymers (SMPs) are a programmable (multi)stimuli-responsive polymers that change shape and stiffness through a thermal transition such as a glass transition. SMPs can recover their initial shape upon direct or Joule heating, radiation and laser heating, microwaves, pressure, moisture, solvent or solvent vapours and change in the pH values. Shape-memory polymers differ from SMAs by their glass transition or melting transition from a hard to a soft phase which is responsible for the shape-memory effect. In shape-memory alloys martensitic/austenitic transitions are responsible for the shape-memory effect. There are numerous advantages that make SMPs more attractive than shape memory alloys; however there are also significant disadvantages. Applications of SMPs include smart textiles, medical devices, heat shrinkable packages for electronics, light-weight morphing structures, tunable damping structures and micro-actuators in unmanned aerial vehicles (UAVs).

The Global Market for Shape Memory Materials 2023-2033 includes:

Applications and markets for shape memory alloys and shape memory polymers.

Analysis of shape memory materials by types and properties.

Patent analysis.

Assessment of economic prospects of the market for shape memory materials.

Market trends impacting the market for shape memory materials.

Main applications and markets for shape memory materials. Markets covered include biomedical, actuators across multiple markets, electronics, consumer goods, construction, tires, textiles, aerospace, soft robotics, automotive etc.

Shape memory market demand forecast (revenues), by type, market and region. Historical data 2015-2021, and market estimates to 2033.

Shape memory materials producer profiles. Companies profiled include Awaji Materia Co., Ltd., Cambridge Smart Plastics, Dynalloy, Inc., Furukawa Electric Group, Maruho Hatsujyo Kogyo Co., Ltd., Nippon, re-fer AG, SAES Group (Memry Corporation), The Smart Tire Company, VenoStent etc.

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