

The Global Market for Self-Healing Materials 2024-2034

<https://marketpublishers.com/r/G2EE9AA196AFEN.html>

Date: December 2023

Pages: 210

Price: US\$ 1,252.00 (Single User License)

ID: G2EE9AA196AFEN

Abstracts

Inspired by natural biological systems, continuous efforts are being made to mimic natural materials and integrate self-healing capabilities into coatings, polymers and polymer composites. Research on self-healing materials and coatings has grown significantly in the last decade, as they are attractive for extending asset life and improving safety in response to environmental changes. The need for sustainability use of oil-based materials is of increasing importance and the use of self-healing materials and coatings can greatly increase their lifetime.

Self-healing materials have the ability to autonomously sense and repair damage, extending product lifetime and provide the basis for long-term reliability. This will avoid or reduce the costs of repair and greatly improve safety.

The Global Market for Self-Healing Materials 2024-2034 provides a comprehensive analysis of the rapidly growing global self-healing materials market. It offers detailed quantitative revenue forecasts from 2015-2034, segmented by end use sector (aerospace, automotive, electronics, energy, construction, coatings, healthcare etc) and region (North America, Europe, Asia Pacific, Rest of World).

The report analyzes key market drivers, latest product innovations, technology readiness levels, IP landscape, SWOT analysis and commercial activity across major applications such as self-healing composites, concrete, batteries, elastomers, electronics, and coatings. Over 40 leading companies are profiled including product portfolios and IP.

Report contents include:

Quantitative Revenue Forecasts

Granular 10-year projections from 2015-2034 for total market and by 12 key end use sectors

Regional market value predictions for North America, Europe, Asia Pacific, Rest of World

Analysis of market size and commercial activity for new technologies

Technology Analysis

Comparative assessment of extrinsic vs intrinsic self-healing mechanisms

Technological review of latest innovations: vascular networks, vitrimers, organic coatings etc.

Evaluation of material formulations including polymers, hydrogels, concrete etc.

Competitor Landscape

Profiles of 44 leading companies developing products and IP. Companies profiled include A2O Advanced Materials Inc., Autonomic Materials, CompPair Technologies, Green Basilisk, Hyundai Motor Group, Mimicrete, NEI Corporation, and Tandem Repeat.

Review of patents shaping new product development

Assessment of partnerships, strategy and R&D focus by sector

Application Segmentation

Overviews of self-healing use cases: composites, batteries, electronics, biomedical etc.

Commercial activity mapping and product pipeline by aerospace, construction, coatings, healthcare etc.

Technology readiness analysis, SWOT analysis and growth opportunities by

vertical

Strategic Recommendations

Macro growth drivers, market challenges and investment opportunities

New product roadmapping support for executives, investors and startups

Market entry and expansion considerations by sector and geography

Contents

1 EXECUTIVE SUMMARY

- 1.1 Market opportunity for self-healing materials
- 1.1 Benefits of self-healing
- 1.2 Types of healing by material formulation and format
- 1.3 Trends in self-healing materials
- 1.4 Commercialising self-healing products
 - 1.4.1 Construction materials
 - 1.4.2 Self-healing paint protection film
 - 1.4.3 PVC cutting mats
- 1.5 Biomimetics
- 1.6 Global market revenues, historical and forecast to 2033
 - 1.6.1 By end use market
 - 1.6.2 By region
- 1.7 SWOT analysis
- 1.7 Market roadmap

2 RESEARCH METHODOLOGY

- 2.1 Report scope

3 INTRODUCTION

- 3.1 Self-healing mechanism and categorization
 - 3.1.1 Extrinsic self-healing
 - 3.1.1.1 Microencapsulated healing agents
 - 3.1.1.2 Vascular self-healing
 - 3.1.1.3 Shape Memory assisted healing
 - 3.1.1.4 Reversible Bonds
 - 3.1.1.5 External Stimulation
 - 3.1.1.6 SWOT analysis
 - 3.1.2 Intrinsic self-healing
 - 3.1.2.1 Reversible Covalent Bonds
 - 3.1.2.2 Ionomer Healing
 - 3.1.2.3 Reversible Polymer Networks
 - 3.1.2.4 Microscopic Mobility
 - 3.1.2.5 Microcapsule Monomer Diffusion

- 3.1.2.6 Sustainable intrinsic self-healing materials
- 3.1.2.7 SWOT analysis
- 3.1.3 Comparison of self-healing systems.
- 3.1.4 Healing volume
- 3.2 Types of self-healing materials
 - 3.2.1 Self-healing coatings
 - 3.2.2 Anti-corrosion
 - 3.2.3 Scratch repair
 - 3.2.4 Self-healing polymers
 - 3.2.4.1 Thermally reversible reactions
 - 3.2.4.2 Photoreversible reactions
 - 3.2.4.3 Molecular interdiffusion
 - 3.2.4.4 Reversible bond formation
 - 3.2.4.5 Self-healing elastomers intrinsic and extrinsic
 - 3.2.5 Shape memory assisted self-healing
 - 3.2.6 Self-healing metals
 - 3.2.7 Self-healing fiber-reinforced polymer composites
 - 3.2.8 Metal matrix composites
 - 3.2.9 Self-Healing and Morphing Composites
 - 3.2.10 Self-healing ceramics and ceramic composites
 - 3.2.11 Self-healing nanomaterials
 - 3.2.12 Self-healing biomaterials
 - 3.2.13 3d printing of self-healing materials
 - 3.2.14 Self-healing under water
 - 3.2.15 Membranes
 - 3.2.16 Factors affecting self-healing

4 SELF-HEALING MATERIALS ANALYSIS

- 4.1 Polyurethane clear coats
 - 4.1.1 Properties
 - 4.1.2 Markets
- 4.2 Micro-/nanocapsules
 - 4.2.1 Properties
 - 4.2.2 Manufacturing
 - 4.2.3 Markets
- 4.3 Microvascular networks
 - 4.3.1 Properties
 - 4.3.2 Markets

- 4.4 Ionomers
 - 4.4.1 Properties
 - 4.4.2 Markets
- 4.5 Click polymerization
 - 4.5.1 Properties
 - 4.5.2 Markets
- 4.6 Supramolecular bonding and MSA
 - 4.6.1 Properties
- 4.7 Vitrimers
 - 4.7.1 Properties
- 4.8 Self-healing hydrogels
 - 4.8.1 Self-healing mechanisms
 - 4.8.1.1 Hydrogen Bonding
 - 4.8.1.2 Ionic Bonds
 - 4.8.1.3 Host-Guest Interactions
 - 4.8.1.4 Hydrophobic Bonds
 - 4.8.1.5 Imine Bonds
 - 4.8.1.6 Arylhydrazone bonds
 - 4.8.1.7 Diels-Alder Reaction
 - 4.8.2 Types and materials
 - 4.8.2.1 Natural Polymers
 - 4.8.2.2 Synthetic polymers
 - 4.8.2.3 Polyampholyte self-healing hydrogels
 - 4.8.2.3.1 Reversible polymer self-healing hydrogels
 - 4.8.2.4 Peptides
 - 4.8.2.5 Mussel-inspired proteins
 - 4.8.2.6 Bacterial cellulose
 - 4.8.2.7 Conductive polymers
 - 4.8.2.8 Zwitterionic polymers
 - 4.8.2.9 Nanomaterial self-healing hydrogels
 - 4.8.2.9.1 Graphene
 - 4.8.2.9.2 Carbon nanotubes
 - 4.8.2.9.3 Nanoclays
 - 4.8.2.9.4 Silicate nanoparticles
 - 4.8.2.9.5 Magnetic nanoparticles
 - 4.8.3 Markets and applications
- 4.9 Carbon nanotubes
 - 4.9.1 Properties
- 4.10 Graphene and other 2D materials

- 4.10.1 Properties
- 4.11 Shape memory-assisted self-healing
 - 4.11.1 Properties
- 4.12 Self-healing proteins
 - 4.12.1 Properties
- 4.13 Piezoelectric crystals
- 4.14 Morphing host structures and shapeshifting materials

5 PATENT ANALYSIS

6 TECHNOLOGY READINESS LEVEL (TRL)

7 MARKETS FOR SELF-HEALING MATERIALS

- 7.1 Aerospace
 - 7.1.1 Market drivers
 - 7.1.2 Applications
 - 7.1.2.1 Self-healing composites
 - 7.1.2.2 Self-healing thermal interface materials
 - 7.1.3 Commercial activity
 - 7.1.4 SWOT analysis
 - 7.1.5 Revenues
- 7.2 Automotive
 - 7.2.1 Market drivers
 - 7.2.2 Applications
 - 7.2.2.1 Self-healing glass
 - 7.2.2.2 Self-healing coatings for scratch repair
 - 7.2.2.3 Self-healing composites
 - 7.2.2.4 Self-healing tires
 - 7.2.3 Commercial activity
 - 7.2.4 SWOT analysis
 - 7.2.5 Revenues
- 7.3 Electronics
 - 7.3.1 Market drivers
 - 7.3.2 Applications
 - 7.3.2.1 Colorless polyimides (CPIs)
 - 7.3.2.2 Self-healing displays
 - 7.3.2.3 Self-healing consumer electronic device coatings
 - 7.3.2.4 Flexile insulators

- 7.3.2.5 Self-healing flexible and stretchable wearables
- 7.3.2.6 Self-healing soft robotics
- 7.3.2.7 6G Reconfigurable Intelligent Surfaces
- 7.3.3 Commercial activity
- 7.3.4 SWOT analysis
- 7.3.5 Revenues
- 7.4 Energy
 - 7.4.1 Applications
 - 7.4.1.1 Self-healing materials for Lithium batteries
 - 7.4.1.2 Self-healing flexible batteries
 - 7.4.1.3 Self-healing supercapacitors
 - 7.4.1.4 Fuel cells
 - 7.4.1.5 Gas turbine coatings
 - 7.4.1.6 Wind energy
 - 7.4.1.7 Self-healing photovoltaics
 - 7.4.2 Commercial activity
 - 7.4.3 SWOT analysis
 - 7.4.4 Revenues
- 7.5 Adhesives and Elastomers
 - 7.5.1 Market drivers
 - 7.5.2 Applications
 - 7.5.2.1 Self-healing elastomers
 - 7.5.2.2 VPTA vitrimer adhesive
 - 7.5.3 Commercial activity
 - 7.5.4 SWOT analysis
 - 7.5.5 Revenues
- 7.6 Buildings and construction
 - 7.6.1 Market drivers
 - 7.6.2 Applications
 - 7.6.2.1 Intrinsic with additives
 - 7.6.2.2 Bacteria with post treatment
 - 7.6.2.3 Enzymes
 - 7.6.2.4 Funghi
 - 7.6.2.5 Natural polymers
 - 7.6.2.6 Self-healing concrete
 - 7.6.2.7 Fibre concrete
 - 7.6.2.8 Self-healing road surfaces and asphalt
 - 7.6.2.9 Self-Healing structural ceramics
 - 7.6.3 Commercial activity

- 7.6.4 SWOT analysis
- 7.6.5 Revenues
- 7.7 Paint and coatings
 - 7.7.1 Market drivers
 - 7.7.2 Applications
 - 7.7.2.1 Self-healing anti-corrosion coatings
 - 7.7.2.2 Anti-fouling coatings
 - 7.7.2.3 Self-healing polymer film and paint
 - 7.7.2.4 Ice-phobic coatings
 - 7.7.3 Commercial activity
 - 7.7.4 SWOT analysis
 - 7.7.5 Revenues
- 7.8 Healthcare
 - 7.8.1 Market drivers
 - 7.8.2 Applications
 - 7.8.2.1 Drug or cell delivery carriers
 - 7.8.2.2 Tissue Engineering
 - 7.8.2.3 Artificial muscle and cartilage
 - 7.8.2.4 Self-healing dental composites
 - 7.8.2.5 Self-healing orthopaedic implants
 - 7.8.2.6 Artificial human skin
 - 7.8.2.7 Strain biosensors
 - 7.8.2.8 Prosthetics and soft robotics
 - 7.8.2.9 Bone repair
 - 7.8.3 Commercial activity
 - 7.8.4 SWOT analysis
 - 7.8.5 Revenues
- 7.9 Other markets
 - 7.9.1 Filtration
 - 7.9.1.1 Applications
 - 7.9.1.1.1 Self-healing materials for membrane separation
 - 7.9.1.1.2 Desalination membrane
 - 7.9.1.1.3 Kidney dialysis membrane
 - 7.9.2 Textiles
 - 7.9.2.1 Applications
 - 7.9.2.1.1 Self-healing fabrics
 - 7.9.2.1.2 Programmable Textiles
 - 7.9.3 Military
 - 7.9.3.1 Applications

7.9.3.1.1 Self-healing aircraft

7.9.3.1.2 Self-healing vehicles

7.9.4 Oil and gas

7.9.4.1 Applications

7.9.4.1.1 Corrosion and other protection

7.9.4.1.2 Self-healing metals

7.9.5 Marine

7.9.5.1 Applications

7.9.5.2 Commercial activity

8 COMPANY PROFILES 173 (44 COMPANY PROFILES)

9 REFERENCES

List Of Tables

LIST OF TABLES

- Table 1. Types of healing by material formulation and format.
- Table 2. Trends in self-healing materials.
- Table 3. The global market for self-healing materials 2015-2034 (Millions USD).
- Table 4. The global market for self-healing materials 2015-2034 (Millions USD), by end use market.
- Table 5. The global market for self-healing materials 2015-2034 (Millions USD), by region.
- Table 6. Types of self-healing materials.
- Table 7. Comparative properties of self-healing materials.
- Table 8. Healing mechanism for different materials.
- Table 9. Properties of self-healing polymers.
- Table 10. Recent research in self-healing metals.
- Table 11. Types of self-healing nanomaterials.
- Table 12. Influencing factors and their effects on healing efficiency.
- Table 13. Companies producing polyurethane clear coat products for self-healing.
- Table 14. Self-healing natural polymers.
- Table 15. Synthetic polymers.
- Table 16. Components, preparation and properties of representative conductive polymer hydrogels.
- Table 17. Properties of graphene.
- Table 18. Applications of self-healing hydrogels.
- Table 19. Properties of graphene.
- Table 20. Technology Readiness Level (TRL) Examples.
- Table 21. Self-healing materials and coatings markets and applications.
- Table 22. Market drivers for self-healing materials in aerospace.
- Table 23. Commercial activity in self-healing aerospace applications.
- Table 24. The market for self-healing materials, polymers and coatings 2015-3034, Millions USD, in the aerospace sector, conservative and high estimates.
- Table 25. Market drivers for self-healing materials in the automotive sector.
- Table 26. Commercial activity in self-healing automotive applications.
- Table 27. The market for self-healing materials, polymers and coatings 2015-3034, Millions USD, in the automotive sector, conservative and high estimates.
- Table 28. Market drivers for self-healing materials in electronics.
- Table 29. Commercial activity in self-healing energy applications.
- Table 30. The market for self-healing materials, polymers and coatings 2015-3034,

Millions USD, in the electronics sector, conservative and high estimates.

Table 31. Commercial activity in self-healing energy applications.

Table 32. The market for self-healing materials, polymers and coatings 2015-3034, Millions USD, in the energy sector, conservative and high estimates.

Table 33. Market drivers for self-healing materials in adhesives and elastomers.

Table 34. Types of self-healing elastomers.

Table 35. Commercial activity in self-healing elastomers.

Table 36. The market for self-healing materials, polymers and coatings 2015-3034, Millions USD, in the elastomers sector, conservative and high estimates.

Table 37. Market drivers for self-healing materials in buildings and construction.

Table 38. Types of self-healing concrete.

Table 39. Commercial activity in self-healing construction applications.

Table 40. The market for self-healing materials, polymers and coatings 2015-3034,, Millions USD, in the construction sector, conservative and high estimates.

Table 41. Market drivers for self-healing materials in paint and coatings.

Table 42. Commercial activity in self-healing paints and coatings applications.

Table 43. The market for self-healing materials and polymers in paints and coatings 2015-3034, Millions USD, in the construction sector, conservative and high estimates.

Table 44. Market drivers for self-healing materials in healthcare.

Table 45. Commercial activity in self-healing healthcare applications.

Table 46. The market for self-healing materials, polymers and coatings 2015-3034, Millions USD, in the healthcare sector, conservative and high estimates.

Table 47. Market drivers for self-healing materials in the oil and gas.

Table 48. Commercial activity in self-healing marine applications.

List Of Figures

LIST OF FIGURES

- Figure 1. The global market for self-healing materials 2015-2034 (Millions USD).
- Figure 2. The global market for self-healing materials 2015-2034 (Millions USD), by end use market.
- Figure 3. The global market for self-healing materials 2015-2034 (Millions USD), by region.
- Figure 4. SWOT analysis for self-healing materials.
- Figure 5. Self-healing materials roadmap.
- Figure 6. Self-healing mechanism found in nature.
- Figure 7. Schematic of self-healing polymers. Capsule based (a), vascular (b), and intrinsic (c) schemes for self-healing materials. Red and blue colours indicate chemical species which react (purple) to heal damage.
- Figure 8. Stages of self-healing mechanism.
- Figure 9. Self-healing mechanism in vascular self-healing systems.
- Figure 10. Extrinsic self-healing SWOT analysis.
- Figure 11. Intrinsic self-healing SWOT analysis.
- Figure 12. Comparison of self-healing systems.
- Figure 13. Self-healing mechanism of polymers.
- Figure 14. Applications of self-healing elastomers.
- Figure 15. Illustration of BN precipitation on the creep cavity surface in stainless steel.
- Figure 16. Schematic diagram of influencing factors on self-healing efficiency.
- Figure 17. Schematic of the self-healing concept using microcapsules with a healing agent inside.
- Figure 18. Healing process in a hydrogel.
- Figure 19. Chemical and noncovalent interactions behind self-healable hydrogels.
- Figure 20. (A) Wound self-healing process (B) Different forms of wound dressings.
- Figure 21. Schematic of single-walled carbon nanotube.
- Figure 22. Self-healing materials patent analysis 2010-2022.
- Figure 23. TRL for self-healing materials, polymers and coatings.
- Figure 24. Microspheres incorporating self-healing materials.
- Figure 25. Flow of self-healing materials into the crack site.
- Figure 26. SWOT analysis for self-healing materials in aerospace.
- Figure 27. The market for self-healing materials, polymers and coatings 2015-3034, Millions USD, in the aerospace sector, conservative and high estimates.
- Figure 28. Nissan Scratch Shield.
- Figure 29. Lamborghini self-healing sports-car.

Figure 30. Self-healing tires.

Figure 31. SWOT analysis for self-healing materials in automotive.

Figure 32. The market for self-healing materials, polymers and coatings 2015-3034, Millions USD, in the automotive sector, conservative and high estimates.

Figure 33. Self-healing dielectric material for wearable electronics.

Figure 34. Self-healing patent schematic.

Figure 35. Self-healing coating on glass.

Figure 36. Self-healing glass developed at the University of Tokyo.

Figure 37. SWOT analysis for self-healing materials in electronics.

Figure 38. The market for self-healing materials, polymers and coatings 2015-3034,, Millions USD, in the electronics sector, conservative and high estimates.

Figure 39. Schematic of self-healing solar cell.

Figure 40. SWOT analysis for self-healing materials in energy.

Figure 41. The market for self-healing materials, polymers and coatings 2015-3034, Millions USD, in the energy sector, conservative and high estimates.

Figure 42. Self-healing rubber.

Figure 43. SeRM elastomers.

Figure 44. SWOT analysis for self-healing materials in elastomers.

Figure 45. The market for self-healing materials, polymers and coatings 2015-3034, Millions USD, in the elastomers sector, conservative and high estimates.

Figure 46. Self-healing bacteria crack filler for concrete.

Figure 47. Self-healing concrete.

Figure 48. SWOT analysis for self-healing materials in construction.

Figure 49. The market for self-healing materials, polymers and coatings 2015-3034, Millions USD, in the construction sector, conservative and high estimates.

Figure 50. SWOT analysis for self-healing materials in paints and coatings.

Figure 51. The market for self-healing materials and polymers in paints and coatings 2015-3034, Millions USD, in the construction sector, conservative and high estimates.

Figure 52. SWOT analysis for self-healing materials in healthcare.

Figure 53. The market for self-healing materials, polymers and coatings 2015-3034, Millions USD, in the healthcare sector, conservative and high estimates.

Figure 54. Self-healing fabrics.

Figure 55. Schematic of the nanocapsule-based self-healing coatings.

Figure 56. Sensicrete compound.

Figure 57. CompPair self-healing prepregs.

I would like to order

Product name: The Global Market for Self-Healing Materials 2024-2034

Product link: <https://marketpublishers.com/r/G2EE9AA196AFEN.html>

Price: US\$ 1,252.00 (Single User License / Electronic Delivery)

If you want to order Corporate License or Hard Copy, please, contact our Customer Service:

info@marketpublishers.com

Payment

To pay by Credit Card (Visa, MasterCard, American Express, PayPal), please, click button on product page <https://marketpublishers.com/r/G2EE9AA196AFEN.html>

To pay by Wire Transfer, please, fill in your contact details in the form below:

First name:
Last name:
Email:
Company:
Address:
City:
Zip code:
Country:
Tel:
Fax:
Your message:

****All fields are required**

Customer signature _____

Please, note that by ordering from marketpublishers.com you are agreeing to our Terms & Conditions at <https://marketpublishers.com/docs/terms.html>

To place an order via fax simply print this form, fill in the information below and fax the completed form to +44 20 7900 3970