

The Global Market for Electronic Textiles, Skin Patches and Wearable Electronics, Batteries & Sensors 2022-2032

<https://marketpublishers.com/r/G34BE7E62E2EEN.html>

Date: April 2022

Pages: 555

Price: US\$ 1,400.00 (Single User License)

ID: G34BE7E62E2EEN

Abstracts

The Global Market for Electronic Textiles, Skin Patches & Wearable Electronics, Batteries and Sensors presents the latest developments in electronic textiles, wearable electronics, batteries and sensors as well as skin patches including remote sensing technologies for continuous measurement and modulation of body parameters including glucose, heart rate, blood pressure, sweat, etc.

Report contents include:

Market analysis of smart skin patches, e-textiles, wearable batteries & sensors, printed, flexible and stretchable electronics. Including invasive as well as non-invasive technologies, on-skin and textile electronics and use for clothing, communication, information, healthcare monitoring, sensing etc.

In depth commercial assessment including products, producers, functionalities and prices.

Global market revenues, historical and forecast to 2032 for e-textiles, skin patches and wearable electronics, batteries & sensors.

336 company profiles. Companies profiled include Almaxwave, Ava AG, Azalea Vision, BioIntelliSense, Cefaly Technology, Cogwear, GE Healthcare, InnovationLab, Jabil, Liquid Metal, Medtronic, Myant, Nanoleq AG, Organic Robotics Corporation, Wise SRL etc.

Contents

1 EXECUTIVE SUMMARY

- 1.1 The evolution of electronics
- 1.2 The wearables revolution
- 1.3 Wearable market leaders
- 1.4 From rigid to flexible and stretchable
- 1.5 Flexible and stretchable electronics in wearables
- 1.6 Stretchable artificial skin
- 1.7 Organic and printed electronics
- 1.8 Wearable electronics in the textiles industry
- 1.9 New conductive materials
- 1.10 Foldable smartphones and tablets
- 1.11 Entertainment
- 1.12 Growth in flexible and stretchable electronics market
- 1.13 Innovations at CES 2021
- 1.14 Innovations at CES 2022
- 1.15 Investment funding 2019-2022

2 WEARABLE ELECTRONICS

- 2.1 Market drivers and trends
- 2.2 Recent developments
- 2.3 Smartwatches
 - 2.3.1 Recent innovations
 - 2.3.2 Health monitoring
 - 2.3.3 Energy harvesting for powering smartwatches
 - 2.3.4 Main smart watch producers and products
- 2.4 Sports and fitness trackers
 - 2.4.1 Wearable devices
 - 2.4.2 Skin patches
 - 2.4.3 Products
- 2.5 Sleep trackers and wearable monitors
 - 2.5.1 Built in function in smart watches and fitness trackers
 - 2.5.2 Smart rings
 - 2.5.3 Headbands
 - 2.5.4 Patches
 - 2.5.5 Masks

2.6 Smart glasses and head-mounted displays (VR, AR, MR, vision loss and eye trackers)

- 2.6.1 Products
- 2.6.2 Virtual Reality (VR) devices
- 2.6.3 Augmented (AR) headsets and smart glasses
- 2.6.4 Mixed Reality (MR) smart glasses

2.7 Military wearables

2.8 Industrial and workplace monitoring

- 2.8.1 Products

2.9 Global market size

- 2.9.1 By product type, 2015-2032, billions USD
- 2.9.2 Market share by product type

2.10 Market challenges

3 SKIN PATCHES

3.1 Market drivers

3.2 Current state of the art

- 3.2.1 Wearable medical device products
- 3.2.2 Temperature and respiratory rate monitoring

3.3 Wearable health monitoring and rehabilitation

- 3.3.1 Companies and products

3.4 Electronic skin patches

- 3.4.1 Applications

- 3.4.2 Materials

- 3.4.2.1 Nanomaterials-based devices

- 3.4.3 Continuous glucose monitoring (CGM)

- 3.4.3.1 Minimally-invasive CGM sensors

- 3.4.3.2 Non-invasive CGM sensors

- 3.4.3.3 Minimally-invasive and non-invasive glucose monitoring companies and products

- 3.4.4 Cardiovascular

- 3.4.4.1 ECG sensors

- 3.4.4.1.1 Companies and products

- 3.4.4.2 PPG sensors

- 3.4.4.2.1 Companies and products

- 3.4.5 Pregnancy and newborn monitoring

- 3.4.5.1 Companies and products

- 3.4.6 Wearable temperature monitoring

- 3.4.6.1 Companies and products
- 3.4.7 Hydration sensors
 - 3.4.7.1 Companies and products
- 3.4.8 Wearable sweat sensors (medical and sports)
 - 3.4.8.1 Companies and products
- 3.5 Wearable drug delivery
 - 3.5.1 Companies and products
- 3.6 Cosmetics patches
 - 3.6.1 Companies and products
- 3.7 Smart footwear for health monitoring
 - 3.7.1 Companies and products
- 3.8 Smart contact lenses
 - 3.8.1 Companies and products
- 3.9 Smart woundcare
 - 3.9.1 Companies and products
- 3.10 Wearable exoskeletons
 - 3.10.1 Companies and products
- 3.11 Medical hearables
 - 3.11.1 Companies and products
- 3.12 Global market size
 - 3.12.1 By product type, 2015-2032, billions USD
 - 3.12.2 Market share, by product type
- 3.13 Market challenges

4 ELECTRONIC TEXTILES (E-TEXTILES)

- 4.1 Market drivers
- 4.2 Performance requirements for E-textiles
- 4.3 Growth prospects for electronic textiles
- 4.4 Materials and components
 - 4.4.1 Conductive and stretchable yarns
 - 4.4.2 Conductive polymers
 - 4.4.2.1 PDMS
 - 4.4.2.2 PEDOT: PSS
 - 4.4.3 Conductive coatings
 - 4.4.4 Conductive inks
 - 4.4.5 Nanomaterials
 - 4.4.5.1 Nanocoatings in smart textiles
 - 4.4.5.2 Graphene

- 4.4.5.3 Nanofibers
- 4.4.5.4 Carbon nanotubes
- 4.5 Phase change materials
 - 4.5.1 Temperature controlled fabrics
- 4.6 Smart clothing products
- 4.7 Electronic textile products
- 4.8 Temperature monitoring and regulation
 - 4.8.1 Heated clothing
 - 4.8.2 Heated gloves
 - 4.8.3 Heated insoles
 - 4.8.4 Heated jacket and clothing products
 - 4.8.5 Materials used in flexible heaters and applications
- 4.9 Stretchable E-fabrics
- 4.10 Wearable therapeutic products
- 4.11 Sports and fitness
- 4.12 Smart footwear
 - 4.12.1 Companies and products
- 4.13 Military
- 4.14 Flexible and wearable display advertising
- 4.15 Textile-based lighting
 - 4.15.1 OLEDs
- 4.16 Smart diapers
 - 4.16.1 Companies and products
- 4.17 Automotive
- 4.18 Global market size
 - 4.18.1 E-textiles investments and funding 2020-2021
 - 4.18.2 By product type, 2015-2032, billions USD
 - 4.18.3 Market share, by product type
- 4.19 Market challenges

5 BATTERIES IN E-TEXILES, SKIN PATCHES AND WEARABLE ELECTRONICS

- 5.1 Wearable batteries
- 5.2 Flexible batteries
 - 5.2.1 Technical specifications
 - 5.2.1.1 Approaches to flexibility
 - 5.2.2 Flexible and wearable Metal-sulfur batteries
 - 5.2.3 Flexible and wearable Metal-air batteries
 - 5.2.4 Flexible Lithium-ion Batteries

- 5.2.4.1 Electrode designs
- 5.2.4.2 Fiber-shaped Lithium-Ion batteries
- 5.2.4.3 Stretchable lithium-ion batteries
- 5.2.4.4 Origami and kirigami lithium-ion batteries
- 5.2.5 Flexible Li/S batteries
 - 5.2.5.1 Components
 - 5.2.5.2 Carbon nanomaterials
- 5.2.6 Flexible lithium-manganese dioxide (Li–MnO₂) batteries
- 5.2.7 Flexible zinc-based batteries
 - 5.2.7.1 Components
 - 5.2.7.1.1 Anodes
 - 5.2.7.1.2 Cathodes
 - 5.2.7.2 Challenges
 - 5.2.7.3 Flexible zinc-manganese dioxide (Zn–Mn) batteries
 - 5.2.7.4 Flexible silver–zinc (Ag–Zn) batteries
 - 5.2.7.5 Flexible Zn–Air batteries
 - 5.2.7.6 Flexible zinc-vanadium batteries
- 5.2.8 Fiber-shaped batteries
 - 5.2.8.1 Carbon nanotubes
 - 5.2.8.2 Types
 - 5.2.8.3 Applications
 - 5.2.8.4 Challenges
- 5.2.9 Transparent batteries
 - 5.2.9.1 Components
- 5.2.10 Degradable batteries
 - 5.2.10.1 Components
- 5.2.11 Flexible and stretchable supercapacitors
 - 5.2.11.1 Nanomaterials for electrodes
- 5.3 Printed batteries
 - 5.3.1 Technical specifications
 - 5.3.1.1 Components
 - 5.3.1.2 Design
 - 5.3.1.3 Key features
 - 5.3.1.4 Materials
 - 5.3.1.5 Printing techniques
 - 5.3.1.6 Applications
 - 5.3.2 Lithium-ion (LIB) printed batteries
 - 5.3.3 Zinc-based printed batteries
 - 5.3.4 3D Printed batteries

- 5.3.4.1 3D Printing techniques for battery manufacturing
- 5.3.4.2 Materials for 3D printed batteries
 - 5.3.4.2.1 Electrode materials
 - 5.3.4.2.2 Electrolyte Materials
- 5.3.5 Printed supercapacitors
 - 5.3.5.1 Electrode materials
 - 5.3.5.2 Electrolytes
- 5.4 Energy sources for wearable sensors
- 5.5 Textile-based batteries
- 5.6 Energy harvesting
- 5.7 Powering E-textiles
- 5.8 Advantages and disadvantages of main battery types for E-textiles
- 5.9 Bio-batteries
- 5.10 Challenges for battery integration in smart textiles
- 5.11 Global market to 2032, by types and markets (revenues)

6 COMPANY PROFILES 267 (336 COMPANY PROFILES)

7 RESEARCH METHODOLOGY

8 REFERENCES

List Of Tables

LIST OF TABLES

- Table 1. Types of wearable devices and applications.
- Table 2. Types of wearable devices and the data collected.
- Table 3. Wearable market leaders by market segment.
- Table 4. Applications in printed, flexible and stretchable electronics, by advanced materials type and benefits thereof.
- Table 5. Advanced materials for Printed, flexible and stretchable sensors and Electronics-Advantages and disadvantages.
- Table 6. Sheet resistance (RS) and transparency (T) values for transparent conductive oxides and alternative materials for transparent conductive electrodes (TCE).
- Table 7. Foldable smartphones and tablets, on or near market.
- Table 8. Wearable electronics at CES 2021.
- Table 9. Wearable electronics at CES 2022.
- Table 10. Wearables Investment funding 2019-2022.
- Table 11. Market drivers and trends in wearable electronics.
- Table 12. Wearable health monitors.
- Table 13. Main smart watch producers and products.
- Table 14. Wearable sensors for sports performance.
- Table 15. Wearable sensor products for monitoring sport performance.
- Table 16. Example wearable sleep tracker products and prices.
- Table 17. Smart ring products.
- Table 18. Sleep headband products.
- Table 19. Smart sleep mask products.
- Table 20. Smart glasses companies and products.
- Table 21. VR headset products.
- Table 22. Augmented reality (AR) smart glass products.
- Table 23. Mixed Reality (MR) smart glass products.
- Table 24. Wearable electronics applications in the military.
- Table 25. Wearable workplace products.
- Table 26. Global market for wearable electronics, 2015-2032, by product type, billions \$.
- Table 27. Market challenges in wearable electronics.
- Table 28. Market drivers for printed, flexible and stretchable medical and healthcare sensors and wearables.
- Table 29. Examples of wearable medical device products.
- Table 30. Medical wearable companies applying products to COVID-19 monitoring and analysis.

Table 31. Applications in flexible and stretchable health monitors, by advanced materials type and benefits thereof.

Table 32. Wearable bio-signal monitoring devices.

Table 33. Technologies for minimally-invasive and non-invasive glucose detection-advantages and disadvantages.

Table 34. Commercial devices for non-invasive glucose monitoring not released or withdrawn from market.

Table 35. Minimally-invasive and non-invasive glucose monitoring products.

Table 36. Companies developing wearable sweat sensors.

Table 37. Wearable drug delivery companies and products.

Table 38. Companies and products, cosmetics and drug delivery patches.

Table 39. Companies and products in smart footwear.

Table 40. Companies and products in smart contact lenses.

Table 41. Companies and products in smart wound care.

Table 42. Companies developing wearable exoskeletons.

Table 43. Companies and products in hearables.

Table 44. Global medical and healthcare wearables market, 2017-2032, billions \$, by product.

Table 45. Market challenges in medical and healthcare sensors and wearables.

Table 46. Market drivers for printed, flexible, stretchable and organic electronic textiles.

Table 47. Examples of smart textile products.

Table 48. Performance requirements for E-textiles.

Table 49. Types of flexible conductive polymers, properties and applications.

Table 50. Typical conductive ink formulation.

Table 51. Comparative properties of conductive inks.

Table 52. Applications in textiles, by advanced materials type and benefits thereof.

Table 53. Nanocoatings applied in the textiles industry-type of coating, nanomaterials utilized, benefits and applications.

Table 54. Applications and benefits of graphene in textiles and apparel.

Table 55. Properties of CNTs and comparable materials.

Table 56. Commercially available smart clothing products.

Table 57. Electronic textile products.

Table 58. Example heated jacket products.

Table 59. Heated jacket and clothing products.

Table 60. Examples of materials used in flexible heaters and applications.

Table 61. Companies and products in smart footwear.

Table 62. Wearable electronics applications in the military.

Table 63. Companies developing smart diaper products.

Table 64. E-textiles investments and funding 2020-2021.

Table 65. Global electronic textiles and smart clothing market 2017-2030, revenues (billions USD).

Table 66. Market challenges in E-textiles.

Table 67. Market requirements for energy storage in wearables.

Table 68. Flexible battery applications and technical requirements.

Table 69. Flexible Li-ion battery prototypes.

Table 70. Electrode designs in flexible lithium-ion batteries.

Table 71. Summary of fiber-shaped lithium-ion batteries.

Table 72. Types of fiber-shaped batteries.

Table 73. Components of transparent batteries.

Table 74. Components of degradable batteries.

Table 75. Applications of nanomaterials in flexible and stretchable supercapacitors, by advanced materials type and benefits thereof.

Table 76. Main components and properties of different printed battery types.

Table 77. 2D and 3D printing techniques.

Table 78. Printing techniques applied to printed batteries.

Table 79. Main components and corresponding electrochemical values of lithium-ion printed batteries.

Table 80. Printing technique, main components and corresponding electrochemical values of printed batteries based on Zn–MnO₂ and other battery types.

Table 81. Main 3D Printing techniques for battery manufacturing.

Table 82. Electrode Materials for 3D Printed Batteries.

Table 83. Methods for printing supercapacitors.

Table 84. Electrode Materials for printed supercapacitors.

Table 85. Electrolytes for printed supercapacitors.

Table 86. Main properties and components of printed supercapacitors.

Table 87. Flexible batteries types in wearable sensors.

Table 88. Advantages and disadvantages of batteries for E-textiles.

Table 89. Comparison of prototype batteries (flexible, textile, and other) in terms of area-specific performance.

Table 90. Battery performance test specifications of J. Flex batteries.

List Of Figures

LIST OF FIGURES

- Figure 1. Evolution of electronics.
- Figure 2. Wove Band.
- Figure 3. Wearable graphene medical sensor.
- Figure 4. Stretchable transistor.
- Figure 5. Artificial skin prototype for gesture recognition.
- Figure 6. Applications timeline for organic and printed electronics.
- Figure 7. Applications of wearable flexible sensors worn on various body parts.
- Figure 8. Systemization of wearable electronic systems.
- Figure 9. Intel Horseshoe Bend.
- Figure 10. ThinkPad X1 Fold.
- Figure 11. Motorola Razr.
- Figure 12. Galaxy Fold 2.
- Figure 13. Galaxy Z Flip.
- Figure 14. Tri-fold phone-tablet hybrid.
- Figure 15. TCL rollable phone.
- Figure 16. Xiaomi MIX Flex.
- Figure 17. Baby Monitor.
- Figure 18. Wearable health monitor incorporating graphene photodetectors.
- Figure 19. Wearable bio-fluid monitoring system for monitoring of hydration.
- Figure 20. Beddr SleepTuner.
- Figure 21. TCL NXTWEAR Air.
- Figure 22. Shiftall MeganeX.
- Figure 23. Vuzix Blade.
- Figure 24. NReal Light MR smart glasses.
- Figure 25. Global market for wearables, 2015-2032, by product type, billions US\$.
- Figure 26. Global market for hearables, 2017-2032, by product type, billions US\$.
- Figure 27. Global market for wearables, 2020-2032, by market share of product type
- Figure 28. Connected human body and product examples.
- Figure 29. Companies and products in wearable health monitoring and rehabilitation devices and products.
- Figure 30. Smart e-skin system comprising health-monitoring sensors, displays, and ultra flexible PLEDs.
- Figure 31. Graphene medical patch.
- Figure 32. Graphene-based E-skin patch.
- Figure 33. Technologies for minimally-invasive and non-invasive glucose detection.

- Figure 34. Schematic of non-invasive CGM sensor.
- Figure 35. Adhesive wearable CGM sensor.
- Figure 36. VitalPatch.
- Figure 37. Wearable ECG-textile.
- Figure 38. Wearable ECG recorder.
- Figure 39. Nexkin.
- Figure 40. Bloomlife.
- Figure 41. Enfucell wearable temperature tag.
- Figure 42. TempTraQ wearable wireless thermometer.
- Figure 43. Nanowire skin hydration patch.
- Figure 44. NIX sensors.
- Figure 45. Wearable sweat sensor.
- Figure 46. Wearable sweat sensor.
- Figure 47. Gatorade's GX Sweat Patch.
- Figure 48. Sweat sensor incorporated into face mask.
- Figure 49. Lab-on-Skin.
- Figure 50. D-mine Pump.
- Figure 51. My UV Patch.
- Figure 52. Overview layers of L'Oreal skin patch.
- Figure 53. Digitsole Smartshoe.
- Figure 54. Schematic of smart wound dressing.
- Figure 55. REPAIR electronic patch concept. Image courtesy of the University of Pittsburgh School of Medicine.
- Figure 56. Honda Walking Assist.
- Figure 57. archelis wearable chair.
- Figure 58. Nuheara IQbuds? Max.
- Figure 59. Global medical and healthcare wearables market, 2017-2032, billions \$, by product.
- Figure 60. Global market for medical and healthcare sensors and wearables, 2020-2032, by market share of product type.
- Figure 61. Conductive yarns.
- Figure 62. SEM image of cotton fibers with PEDOT:PSS coating.
- Figure 63. Applications of graphene in smart textiles and apparel.
- Figure 64. PCM cooling vest.
- Figure 65. EXO2 Stormwalker 2 Heated Jacket.
- Figure 66. Flexible polymer-based heated glove, sock and slipper.
- Figure 67. ThermaCell Rechargeable Heated Insoles.
- Figure 68. Myant sleeve tracks biochemical indicators in sweat.
- Figure 69. Flexible polymer-based therapeutic products.

- Figure 70. iStimUweaR .
- Figure 71. Digitsole Smartshoe.
- Figure 72. Basketball referee Royole fully flexible display.
- Figure 73. ABENA Nova smart diaper.
- Figure 74. Textile-based car seat heaters.
- Figure 75. Global electronic textiles and smart clothing 2017-2030, revenues (billions USD).Source: Future Markets.
- Figure 76. Global market for electronics and smart textiles, 2020-2032, by market share of product type.
- Figure 77. Stretchable transistor.
- Figure 78. Ragone plots of diverse batteries and the commonly used electronics powered by flexible batteries.
- Figure 79. Flexible, rechargeable battery.
- Figure 80. Various architectures for flexible and stretchable electrochemical energy storage.
- Figure 81. Types of flexible batteries.
- Figure 82. Materials and design structures in flexible lithium ion batteries.
- Figure 83. Flexible/stretchable LIBs with different structures.
- Figure 84. Schematic of the structure of stretchable LIBs.
- Figure 85. Electrochemical performance of materials in flexible LIBs.
- Figure 86. a–c) Schematic illustration of coaxial (a), twisted (b), and stretchable (c) LIBs.
- Figure 87. a) Schematic illustration of the fabrication of the superstretchy LIB based on an MWCNT/LMO composite fiber and an MWCNT/LTO composite fiber. b,c) Photograph (b) and the schematic illustration (c) of a stretchable fiber-shaped battery under stretching conditions. d) Schematic illustration of the spring-like stretchable LIB. e) SEM images of a fiber at different strains. f) Evolution of specific capacitance with strain. d–f)
- Figure 88. Origami disposable battery.
- Figure 89. Zn–MnO₂ batteries produced by Brightvolt.
- Figure 90. Charge storage mechanism of alkaline Zn-based batteries and zinc-ion batteries.
- Figure 91. Zn–MnO₂ batteries produced by Blue Spark.
- Figure 92. Ag–Zn batteries produced by Imprint Energy.
- Figure 93. Transparent batteries.
- Figure 94. Degradable batteries.
- Figure 95. Schematic of supercapacitors in wearables.
- Figure 96. (A) Schematic overview of a flexible supercapacitor as compared to conventional supercapacitor.
- Figure 97. Stretchable graphene supercapacitor.

Figure 98. Various applications of printed paper batteries.

Figure 99. Schematic representation of the main components of a battery.

Figure 100. Schematic of a printed battery in a sandwich cell architecture, where the anode and cathode of the battery are stacked together.

Figure 101. Manufacturing Processes for Conventional Batteries (I), 3D Microbatteries (II), and 3D-Printed Batteries (III).

Figure 102. Main printing methods for supercapacitors.

Figure 103. Schematic flow chart of self-powering smart wearable sensors.

Figure 104. E-textile flexible, printed and thin film battery applications.

Figure 105. Wearable self-powered devices.

Figure 106. Power supply mechanisms for electronic textiles and wearables.

Figure 107. Revenues for thin film, flexible and printed batteries 2021-2032, by market, millions USD (excluding thin film solid-state batteries).

Figure 108. Libre 3.

Figure 109. KneeStim.

Figure 110. LED hooded jacket.

Figure 111. Heated element module.

Figure 112. Structure of Azalea Vision's smart contact lens.

Figure 113. Cogwear Headband.

Figure 114. Graphene dress. The dress changes colour in sync with the wearer's breathing.

Figure 115. Descante Solar Thermo insulated jacket.

Figure 116. G+ Graphene Aero Jersey.

Figure 117. Roll-to-roll equipment working with ultrathin steel substrate.

Figure 118. HiFlex strain/pressure sensor.

Figure 119. KiTT motion tracking knee sleeve.

Figure 120. KnowU.

Figure 121. Electroskin integration schematic.

Figure 122. Vital Shirt from Nanoleq.

Figure 123. Modius Sleep wearable device.

Figure 124. Nextiles e-fabric.

Figure 125. Prevayl sensor.

Figure 126. Printed battery.

Figure 127. RealWear HMT-1.

Figure 128. Sylvee 1.0.

Figure 129. RootiRx.

Figure 130. Smardii smart diaper.

Figure 131. Teslasuit.

Figure 132. Ultrahuman wearable glucose monitor.

Figure 133. Wiliot tags.

Figure 134. Zeit Medical Wearable Headband.

Figure 135. YouCare smart shirt.

I would like to order

Product name: The Global Market for Electronic Textiles, Skin Patches and Wearable Electronics, Batteries & Sensors 2022-2032

Product link: <https://marketpublishers.com/r/G34BE7E62E2EEN.html>

Price: US\$ 1,400.00 (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/G34BE7E62E2EEN.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

