E-Textiles 2017-2027: Technologies, Markets, Players

Description: We are in contact with textiles for up to 90% of our lives, and they are starting to become intelligent. The basis of this new functionality is the integration of textiles and electronics. From clothing to bandages, bedding to industrial fabrics, new products integrating e-textiles are being created. The market has been slow to start due to many challenges, but with large companies investing heavily and releasing early products, this industry is poised to change very quickly as soon as the right conditions are achieved.

In their purest form according to the definition, e-textiles based on the integration of inherently electrically or electronically active fibres have begun to see integration into early products. However, with many associated challenges around reliability, performance and comfort, there has been a strong push towards other solutions that can achieve better properties including washability, stretchability and new functionalities. The result is a complex ecosystem of different material, component and connection options that are now available for product designers.

This report covers the entire e-textiles value chain, covering the wide range of materials (including metals, polymers, fibres, yarns, textiles (knitted, woven, embroidered, non-woven) and emerging materials) and components (sensors, connectors and the interface to traditional electronics, etc.) used today. It also presents a roadmap for the future, detailing over 30 different academic and early prototype products in areas such as new conductive fibres, stretchable electronics, energy harvesting, energy storage, logic and memory.

The analysts have produced a comprehensive guide to all of the key techniques in use throughout industry and research today. Key advances in the last five years have led to early commercial products, with the market having grown at double digit rate to reach around $100m in annual wholesale revenue today. However, with global giants from both apparel and electronics assessing the sector and building their strategies, analysts detail a likely scenario for growth over the coming decade. Specifically, the report describes how the significant investments being made will eventually enable mainstream commercial products, leading to a market approaching $5bn by 2027.

The report describes the full value chain, looking from the material and component options, to the manufacturing challenges, through to the applications, markets and key end users. Trends by market sector are crucial, as the addressable markets are both large and diverse. The report characterises key market sectors including ‘Sports & Fitness’, ‘Medical & Healthcare’, ‘Wellness’, ‘Home & Lifestyle’, ‘Industrial, commercial, military’, ‘Fashion’ and ‘Others’ (including automotive). For each, we report on progress amongst key players and projects, as well as outlining the unmet needs and growth potential of each.

The forecasts for each sector are accompanied by detailed qualitative discussion for each sector. In fact, the forecast description cites examples of over 110 separate e-textiles projects grouped by company, with additional projects referenced throughout the report. This information has been compiled via extensive primary research, with the report also containing summaries from key industry events, presentations and an additional 28 separate interview-based company profiles detailing key players.

With continuous parallel research across the emerging technology ecosystem (including reports on conductive inks, stretchable electronics, wearable technology, printed electronics, printed and flexible sensors, the Internet of Things, emerging energy storage, and many more) the analysts have leveraged a broad network and experience across the team for this research.

Contents:
1. EXECUTIVE SUMMARY
   1.1. Market forecast for e-textiles - 2017-2027 (by industry sector)
   1.2. Historic sales: 2014-2016 by sector
   1.3. Smart textile industry topics and value chain
   1.4. Commercial progress with e-textile projects

2. INTRODUCTION
   2.1. Definitions
2.2. E-Textiles: Where textiles meet electronics
2.3. The intersection of electronics and textiles industries
2.4. Examples of e-textile products today
2.5. Context within the broader subject: Wearable Technology
2.6. Key trends in wearable technology
2.7. Related applications in Technical Textiles
2.8. Modern developments in context: Woven Electronics®
2.9. Prominent related areas to e-textiles
2.9.1. Electromagnetic Shielding
2.9.2. Antistatic protective clothing
2.9.3. Antimicrobial textiles
2.9.4. Thermal regulation in textiles
2.9.5. Protective clothing for impact resistance
2.9.6. Colour changes in textiles
2.10. Strategies for creating textile-integrated electronics
2.11. Challenges when moving into the e-textiles space
2.12. Parallel investments in textile innovation

3. E-TEXTILE MATERIALS AND COMPONENTS
3.1. E-textiles materials use today
3.2. Introduction: Fibres, yarns and textiles
3.3. Entirely metallic fabrics
3.4. Metal-plated fabrics
3.5. Selective etching of metal-plated textiles
3.6. Use of metal cabling
3.7. Textile Cabling
3.8. Metal wiring integrated into textiles
3.9. Fibres & Yarns
3.10. Conductive yarns from Natural Fibre Welding
3.11. Hybrid yarns can be conductive, elastic and comfortable
3.12. Textiles and Fabrics
3.13. Woven e-textiles
3.15. Knitted e-textiles
3.16. Example: Knitted conductors by Gunze, Japan
3.17. Embroidered e-textiles
3.18. Inks and Encapsulation
3.19. An explosion in ink suppliers for e-textiles
3.20. Conductive polymers
3.21. Polymeric electrodes in compression garments
3.22. Example suppliers for each material type
3.23. Working alongside conventional electronics
3.24. Connectors for e-textiles
3.25. Connector options today
3.26. Snap fasteners
3.27. Thermoplastic adhesive bonding: Fraunhofer IZM
3.28. Soldering
3.29. Conductive adhesives
3.30. Metallic contacts: conventional and bespoke
3.31. Embroidery
3.32. Component types: who is making what?

4. ENABLING TECHNOLOGIES FOR THE FUTURE OF E-TEXTILES
4.1. Emerging types of electrically active fibres and textiles
4.2. European Commission projects
4.3. New conductive fibres from industry and academia
4.4. Novel approaches to conductive textiles: CNT & graphene
4.5. RFID Yarns for asset tracking
4.6. Integrating other electronics within yarns
4.7. Encapsulation of semiconductor chips within yarns
4.8. Examples of stretchable conductive fibres
4.8.1. UT, Dallas: SEBS / NTS stretchable wires
4.8.2. Sungkyunkwan University - PU & Ag nanoflowers
4.8.3. MIT: Stretch sensors using CNTs on polybutyrate
4.9. Energy harvesting techniques in textiles
4.9.1. Piezoelectric fibres: Georgia Institute of Technology, USA
4.9.2. Piezoelectric fibres: University of Bolton, UK
4.9.3. Piezoelectric Fabric
4.9.4. Piezoelectric Fabric: University of Bolton, UK
4.9.5. Piezoelectric Fabric: University of Bolton, UK
4.9.6. Concordia University XS Labs, Canada
4.9.7. Cornell University, USA
4.9.8. Cornell University, USA
4.9.9. Georgia Institute of Technology, USA
4.9.10. Southampton University, UK
4.9.11. University of California Berkeley, USA
4.9.12. Energy-Scavenging Nanofibers: UC Berkeley, USA
4.10. Photovoltaic Fibres
4.10.1. Illuminex, USA
4.10.2. Penn State University, USA
4.10.3. University of Southampton, UK
4.11. Multi-mode energy harvesting in textiles
4.12. Textile Super capacitors
4.12.1. Drexel University, USA
4.12.2. Imperial College London, UK
4.12.3. Stanford University, USA
4.12.4. University of Delaware, USA
4.12.5. University of Wollongong, Australia
4.13. Flexible Woven Batteries
4.13.1. Polytechnic School of Montreal, Canada
4.14. Logic and Memory

5. CASE STUDY - SMART CLOTHING: PAST, PRESENT, FUTURE
5.1. 75 years of ‘Smart Clothing’
5.2. Early commercial examples: Infineon, Philips, O’Neill
5.3. Related products: HRM Chest Straps
5.4. Integrating HRM into clothing
5.5. The wearable technology boom
5.6. The implications of BLE for smart clothing
5.7. Who uses smart clothing today?
5.8. Examples from key sectors
5.9. Large players enter the market: 3 strategies
5.10. When will we see the first mass market e-textile product?

6. E-TEXTILES MARKETS
6.1. Categorisation by market sector
6.2. Sports & Fitness: Overview
6.3. Sports & Fitness: Key product characteristics
6.4. Sports & Fitness: The impact of VC funding
6.5. Sports & Fitness: Key Players
6.6. Wellness
6.7. Medical & Healthcare
6.8. Example: Pressure ulcer monitoring in hospitals
6.9. Home & Lifestyle
6.10. Hospitality markets
6.11. Industrial, Commercial, Military
6.12. Fashion
6.13. Examples of high fashion and bespoke work
6.15. Others: Vehicular Interiors
6.16. Others: Wearable Technology for animals

7. MARKET FORECASTS 2017-2027
7.1. Market forecast for e-textiles - by industry sector
7.2. Historic sales (2014 - 2016) and expectations for 2017
7.3. CAGR by industry sector
7.4. Market forecast for e-textiles: by product type (revenue)
7.5. Market forecast for e-textiles: by product type (volume)
7.6. Consumer apparel & Fashion
7.7. Sport & Fitness
7.8. Home & lifestyle
7.9. Medical & Healthcare
7.10. Wellness
7.11. Industrial, Commercial, Military
7.12. Other Markets
7.13. Technology development (pre-market)

8. PRIMARY RESEARCH AND INTERVIEWS FROM MAJOR EVENTS
8.1. Bando Chemical
8.1.1. Fisk Alloy
8.1.2. Hitachi Chemical
8.1.3. Holst Centre
8.1.4. KIMS & KIMM: conductive textiles
8.1.5. MAS Holdings / Flex
8.1.6. Myant
8.1.7. Panasonic
8.1.8. Parker Hannifin
8.1.9. Polymatech
8.1.10. Sensing Tex
8.1.11. Stretchsense
8.1.12. Toyobo
8.1.13. Vista Medical
8.2. CES 2017 - Las Vegas, NV (January 2017)
8.2.1. Clim8
8.2.2. CloudTot
8.2.3. Conscious Labs
8.2.4. Evalu
8.2.5. King Abdullah University, Saudi Arabia
8.2.6. Under Armour
8.2.7. Vitali

9. RAW DATA
9.1. E-Textiles (by sector) - number of units sold in millions
9.2. E-Textiles (by sector) - total revenue in USD millions
9.3. E-Textiles (by product) - number of units sold in millions
9.4. E-Textiles (by product) - total revenue in USD millions

10. INTERVIEW BASED COMPANY PROFILES
10.1. adidas Wearable Sports Electronics
10.2. AiQ Smart Clothing
10.3. BeBop Sensors
10.4. Brochier Technologies
10.5. Cityzen Sciences
10.6. Clim8
10.7. Clothing+
10.8. Directa Plus
10.9. Eurecat - CETEMMSA
10.10. Flex - Fashion and Apparel division
10.11. Footfalls and Heartbeats
10.12. Forster Rohner Textile Innovations
10.13. Hexoskin
10.14. IMEC - Wearable Health Monitoring
10.15. Infi-tex
10.16. Intelligent Textiles Limited
10.17. Interactive Wear AG
10.18. Luminet Technologies
10.19. Medical Design Solutions
10.20. Ohmatex ApS
10.21. Samsara S.r.l. - Dreamlux
10.22. Sarvint Technologies
10.23. Sensing Tex
10.24. Sensoria
10.25. Smartlife
10.27. Vitali
10.28. Wearable Life Science


Order by Fax - using the form below

Order by Post - print the order form below and send to

Research and Markets,
Guinness Centre,
Taylors Lane,
Dublin 8,
Ireland.
Fax Order Form
To place an order via fax simply print this form, fill in the information below and fax the completed form to 646-607-1907 (from USA) or +353-1-481-1716 (from Rest of World). If you have any questions please visit http://www.researchandmarkets.com/contact/

Order Information
Please verify that the product information is correct and select the format(s) you require.

- Product Name: E-Textiles 2017-2027: Technologies, Markets, Players
- Web Address: http://www.researchandmarkets.com/reports/4109815/
- Office Code: SC2G9PWN

Product Formats
Please select the product formats and quantity you require:

<table>
<thead>
<tr>
<th>Format</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electronic (PDF) - 1 - 5 Users:</td>
<td>USD 5010</td>
</tr>
<tr>
<td>Electronic and Hard Copy (PDF) - 1 - 5 Users:</td>
<td>USD 5310 + USD 56 Shipping/Handling</td>
</tr>
<tr>
<td>Electronic (PDF) - 1 - 10 Users:</td>
<td>USD 7517</td>
</tr>
<tr>
<td>Electronic and Hard Copy (PDF) - 1 - 10 Users:</td>
<td>USD 7818 + USD 56 Shipping/Handling</td>
</tr>
</tbody>
</table>

* Shipping/Handling is only charged once per order.

* The price quoted above is only valid for 30 days. Please submit your order within that time frame to avail of this price as all prices are subject to change.

Contact Information
Please enter all the information below in BLOCK CAPITALS

<table>
<thead>
<tr>
<th>Title:</th>
<th>Mr [ ]</th>
<th>Mrs [ ]</th>
<th>Dr [ ]</th>
<th>Miss [ ]</th>
<th>Ms [ ]</th>
<th>Prof [ ]</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Name:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Last Name:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Email Address: *</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Job Title:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organisation:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Address:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>City:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Postal / Zip Code:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Country:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phone Number:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fax Number:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Please refrain from using free email accounts when ordering (e.g. Yahoo, Hotmail, AOL)
Payment Information

Please indicate the payment method you would like to use by selecting the appropriate box.

☐ Pay by credit card: You will receive an email with a link to a secure webpage to enter your credit card details.

☐ Pay by check: Please post the check, accompanied by this form, to:

Research and Markets,
Guinness Center,
Taylors Lane,
Dublin 8,
Ireland.

☐ Pay by wire transfer: Please transfer funds to:

Account number 833 130 83
Sort code 98-53-30
Swift code ULSBIE2D
IBAN number IE78ULSB98533083313083
Bank Address Ulster Bank,
27-35 Main Street,
Blackrock,
Co. Dublin,
Ireland.

If you have a Marketing Code please enter it below:

Marketing Code: ____________________________

Please note that by ordering from Research and Markets you are agreeing to our Terms and Conditions at http://www.researchandmarkets.com/info/terms.asp

Please fax this form to:
(646) 607-1907 or (646) 964-6609 - From USA
+353-1-481-1716 or +353-1-653-1571 - From Rest of World