

The Global Market for Wearable, Printed, Flexible, Foldable and Stretchable Electronics

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Abstracts

The rapid boom in smart wearable and integrated electronic devices has stimulated demand for advanced intelligent systems with high performance, micro size, mechanical flexibility, and high-temperature stability for application as flexible and stretchable displays, personal health monitoring, human motion capturing, smart textiles, electronic skins and more.

Wearable technology, wearables, or wearable devices is incorporation electronics into clothing or accessories that can be worn on a user's body. The purpose of wearable technologies is to provide entertainment, healthcare, and education in people's daily lives. Wearable electronics encompasses the incorporation of technological components in clothing accessories or objects we carry. The development of next-generation, wearable flexible electronics relies on novel materials that are:

Mechanically flexible.

Low-cost.

Electrically conductive.

Optically transparent.

There is increasing demand for wearable electronics from industries such as:

Medical and healthcare monitoring and diagnostics.

Sportswear and fitness monitoring (bands).

Consumer electronics such as smart watches, smart glasses and headsets.

Military GPS trackers, equipment (helmets) and wearable robots.

Smart apparel and footwear in fashion and sport.

Workplace safety and manufacturing.

The development of printed, flexible and stretchable conductors over the last decade has resulted in commercialization of flexible and stretchable sensors, circuits, displays, and energy harvesters for next-generation wearables and soft robotics. These systems must be able to conform to the shape of and survive the environment in which they must operate. They are typically fabricated on flexible plastic substrates or are printed/woven into fabrics.

The electronics industry is moving at a fast pace from standard, inflexible form factors to stretchable and conformable devices. Printed, flexible and stretchable electronics products are increasing weekly from wearables for healthcare to smart packaging, sensors, automotive tail lights and displays, flexible displays, photovoltaics and more.

Based on a new generation of advanced materials, printed, flexible and stretchable sensors and electronics will enable new possibilities in a diverse range of industries from healthcare to automotive to buildings. These technologies will drive innovation in smart medical technology, automotive, smart manufacturing, Internet of Things (IoT) and consumer electronics.

In the flexible displays market, electronics giants such as Samsung and LG Electronics are rolling out flexible, foldable and rollable smartphone and tablet products. LG's rollable LG Signature's OLED TV R will be available in 2020 and foldable smartphones have already come to market.

Wearable and mobile health monitoring technologies have recently received enormous interest worldwide due to the rapidly aging global populations and the drastically increasing demand for in-home healthcare. Commercially available and near commercial wearable devices facilitate the transmission of biomedical informatics and personal health recording. Body worn sensors, which can provide real-time continuous

measurement of pertinent physiological parameters noninvasively and comfortably for extended periods of time, are of crucial importance for emerging applications of mobile medicine. Wearable sensors that can wirelessly provide pertinent health information while remaining unobtrusive, comfortable, low cost, and easy to operate and interpret, play an essential role.

Battery and electronics producers require thin, flexible energy storage and conversion devices to power their wearable technology. The growth in flexible electronics has resulted in increased demand for flexible, stretchable, bendable, rollable and foldable batteries and supercapacitors as power sources for application in flexible and wearable devices.

Many major companies have integrated conductive and electronic ink and materials in applications ranging from photovoltaics to smart packaging. There are over 100 companies with products in this space for RFID, smart clothing, sensors, antennas and transistors. As well as advancing product security and consumer interaction, the use of smart inks and coatings in active and intelligent packaging can help reduce food waste and improve medical compliance-which would have significant environmental benefits.

Report contents include:

Current applications, state of the art, market and products (including producers, functionalities, prices) in wearable electronics, medical and healthcare monitoring, electronics and smart textiles, energy for wearables, flexible, foldable and stretchable displays and conductive inks.

Advanced materials used in wearables, displays, printed, flexible, foldable and stretchable electronics and sensors.

Stage of commercialization for applications, from basic research to market entry. Markets covered include conductive inks, wearables and IoT, medical & healthcare sensors, electronic clothing & smart apparel, energy harvesting & storage, electronics components and flexible displays.

Market figures for printable, flexible and stretchable electronics, by markets, materials and applications to 2027. Market impact of COVID-19 assessed.

Profiles of over 400 product developers.

60 companies profiled in wearables including BeBop Sensors, dorsaVi Ltd., Epicore Biosystems, Equivital Inc., FeelIT, Hitachi, Ltd., Holst Centre, Magic Leap, miomove s.r.o and more. All smart watch and fitness tracker products profiled including functionalities and prices.

134 companies profiled in medical and healthcare wearables including 1drop Inc., Abbott, AerBetic, Inc., Alertgy, Aura Devices, Biobeat, BioIntelliSense, Cardiomo, CareWear, cosinuss, Dexcom, Embr Labs, Eccrine Systems, Gentag, i-Sens, WBD101 and more.

102 companies profiled in electronic textiles (E-textiles) including Ambiotex, BloomerTech, Chronolife, clim8, Emlare, Formosa Taffeta, Healthwatch Technologies, Hexoskin, Inuheat, Litex, Myant, SankiConsys Co., Ltd. and more.

32 companies profiled in energy storage and harvesting including Bionic Power, BrightVolt, Canatu Oy, ChivoTech, Enfucell Oy, Jenax, LG Chem and more.

57 companies profiled in printed, flexible and stretchable displays including C3Nano, Cambrios, iBeam, CurveSYS GmbH, Etulipa, Futaba, Kyulux, Samsung and more.

98 companies profiled in conductive ink including Ash Chemical, Cemedine, DuPont, EMS/Nagase, Henkel, Jujo Chemical, Panasonic, Taiyo, Toyobo, VFP Ink Technologies, and more.

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