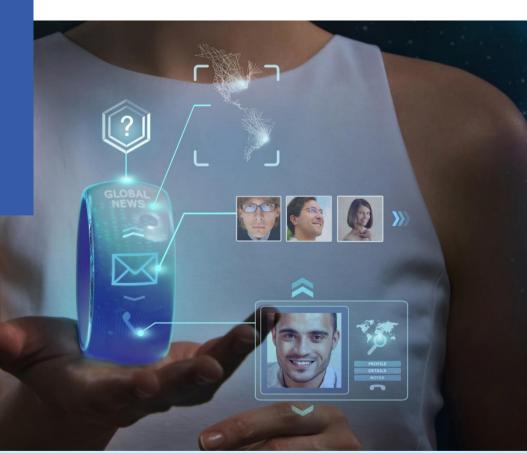
Wearables in 2020: The Impact of COVID-19

Topic overview for 2020 including the impact of COVID-19

This webinar was originally broadcast on 11th June 2020

James Hayward









James Hayward



Principal Analyst

Since joining IDTechEx, James has led IDTechEx's research around markets and enabling technologies for wearable electronics. This has included producing hundreds of interview-based company profiles for companies spanning the entire value chain, and authorship of several IDTechEx reports, including Wearable Technology, Wearable Sensors, E-Textiles and Haptics.

As part of IDTechEx's consulting services, James has worked on custom projects with billiondollar companies based in the USA, Europe, the Middle East and Asia covering various areas surrounding wearable technology, e-textiles, and related topics. This has included detailed material and component benchmarking, competitive analyses and investment partnership advisory services.

As a speaker, James has given keynote presentations on topics including wearable technology, e-textiles, sensors, haptics and other emerging technology trends at international conferences across Europe and the USA.

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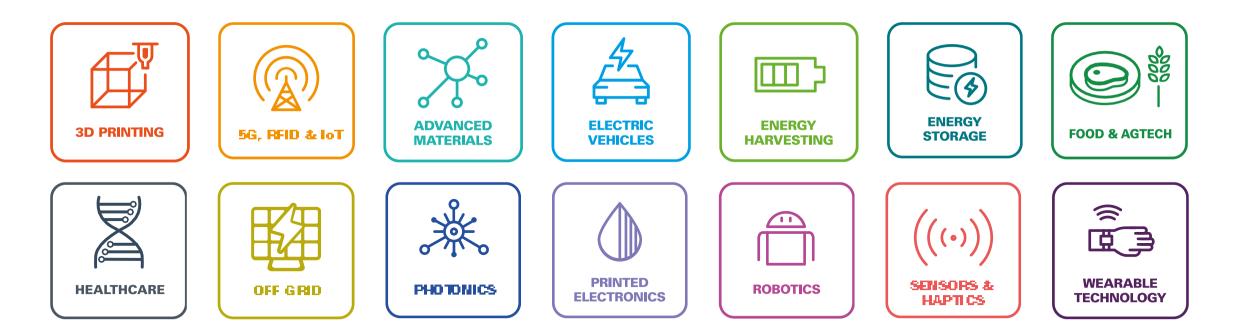


IDTechEx provides clarity on technology innovation

- Technology assessment
- Technology scouting

- Company profiling
- Market sizing

- Market forecasts
- Strategic advice

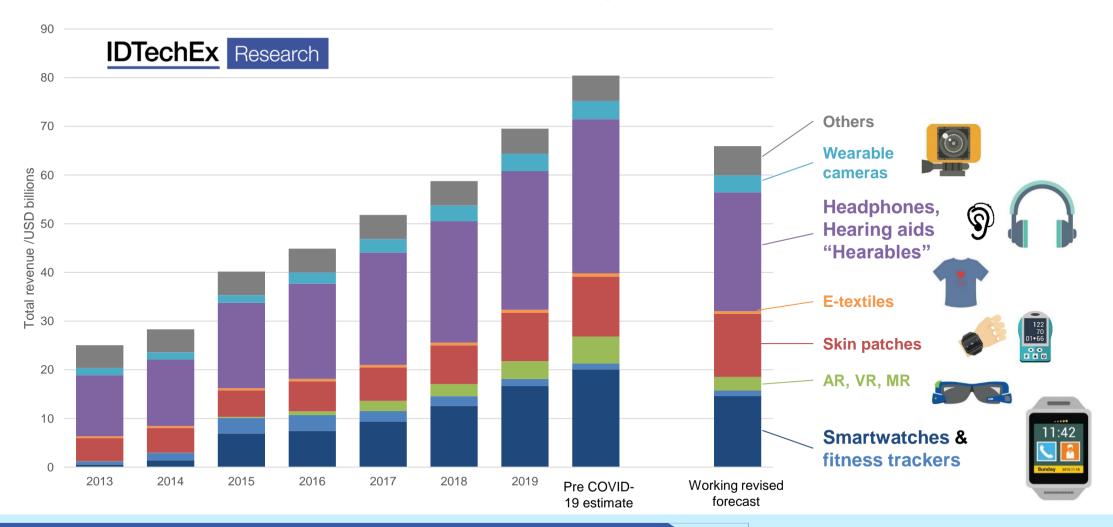


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Wearables: State of the Industry

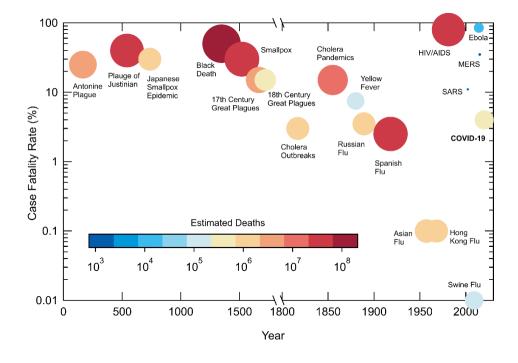
Annual revenue from wearable technology products



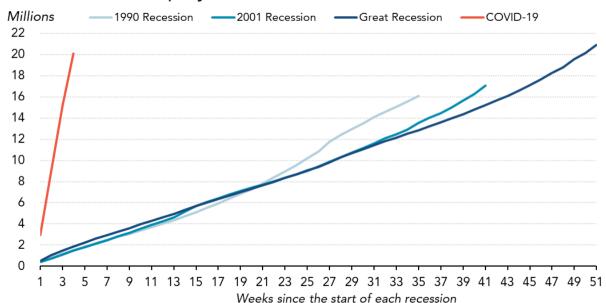
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Economic Impact of COVID-19



Pandemics over time Source: IDTechEx



Cumulative Unemployment Insurance Claims

Source: US Department of Labor, Employment and Training Administration

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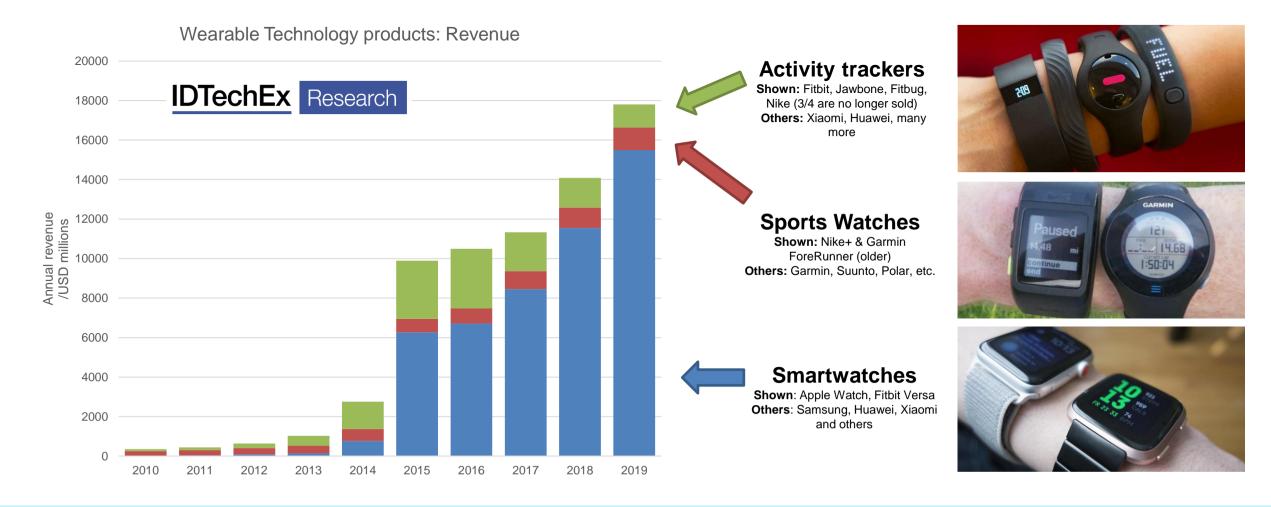
Wearable Technology Forecasts 2020-2030

Hearables	Skin patches	E-textiles	AR, VR, MR	Other wearable product forecasts	
 Cochlear implants Hearing aids OTC hearing aids True wireless stereo headphones Wireless headphones High end wired headphones Low end wired headphones Other hearables 	 Holter monitoring Event monitoring Extended wear Holter monitoring Mobile cardiac telemetry Other cardiac skin patches Insulin pumps Continuous glucose monitors Pregnancy monitoring Other wireless inpatient monitoring Other outpatient monitoring Smart bandages (wound care) Fever monitoring Electrical stimulation Iontophoresis patches Other skin patches 	 Smart clothing for biometric monitoring Heated clothing Illuminated clothing Other e-textile apparel IDTechEx Total = 52 for Revenue, pricing &	ecast lines	 Smartwatches Sports watches Activity trackers Activity trackers Wearable cameras (law enforcement, professional, etc.) Chest strap Smart footwear (simple / sensing) Basic electronic watches Other infotainment Other fitness trackers Other fitness trackers Other s 	

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Smartwatches and Fitness Trackers



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Smartwatches to Track COVID-19 Symptoms



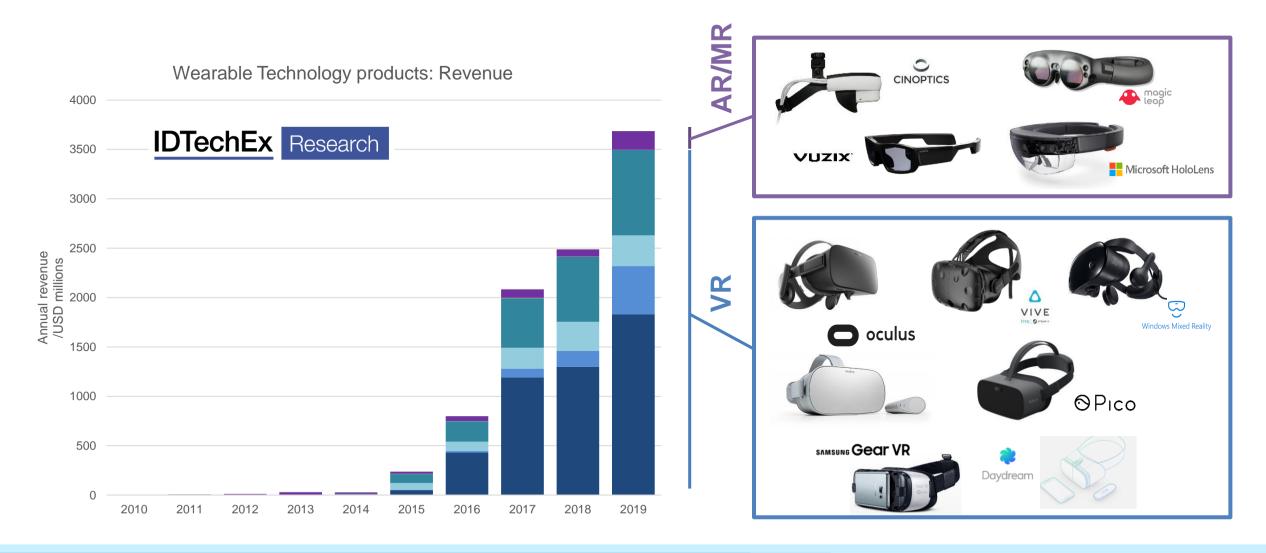


Study looking at smartwatches as a tool to detect and monitor symptoms of COVID-19 is led Michael Snyder, PhD, professor and chair of genetics at the Stanford School of Medicine. Source: Stanford University





Virtual, Augmented and Mixed Reality



Slide 9

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XR in a Time of Pandemic



- Case studies showing uptake in use by doctors during active pandemic
- Applications including
 - Medical education & training
 - Telemedicine, including remote surgery
 - Digital therapeutics
- Significant longer term promotion for remote training and operation, assisted by XR devices (beyond just medical)



Electronic Textiles / Smart Clothing

Application validation

- Sports & fitness
- Healthcare & medical

- Fashion / lifestyle
- Outdoor/performance wear
- Other apparel / wellness
- Non-apparel (industrial textiles, bedsheets / carpets / furniture, automotive interiors, etc.)

IDTechEx Research 2019 estimate, ~ \$0.5bn

Space / military / bespoke

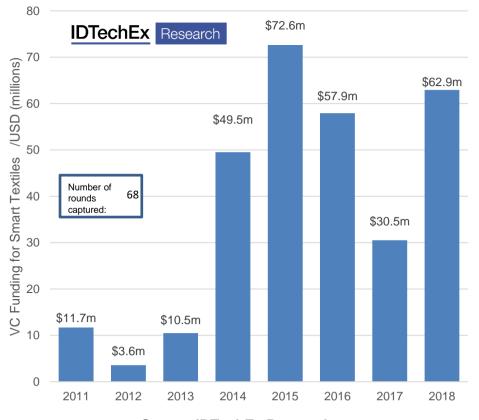


Supply chain maturity

- Inefficiency in early value chain makes profitability more challenging, driving up cost base and price points
- Efficiency is improving, with co-located manufacturing and designs being optimised for easier manufacture



VC funding for E-textiles companies, 2011 - 2018



Source: IDTechEx Research





E-Textile Companies Switching Output to PPE



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Electronic Skin Patches

Cardiac monitoring

Holter & event monitoring, MCT



Left to right: iRhythm Zio, BioTel Heart products Source: iRhythm, BioTelemetry

Diabetes management

CGM and insulin pumps







Market breakdown

2019

Left to right: Dexcom G4, Abbott FreeStyle Libre, Medtronic Minimed. Source: Dexcom, Abbott, Medtronic 2019 total skin patches revenue: **\$9.9 bn**

Others

- Inpatient monitoring
 - E.g. foetal heart rate during labour
 - Infectious disease ward monitoring
- Outpatient monitoring
 Many potential categories
- Smart wound care
- Fever monitoring
- Fertility monitoring
- Electrical stimulation
- Iontophoresis
- Others

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Remote Patient Monitoring – Skin Patch Options







Remote Patient Monitoring – Skin Patch Options







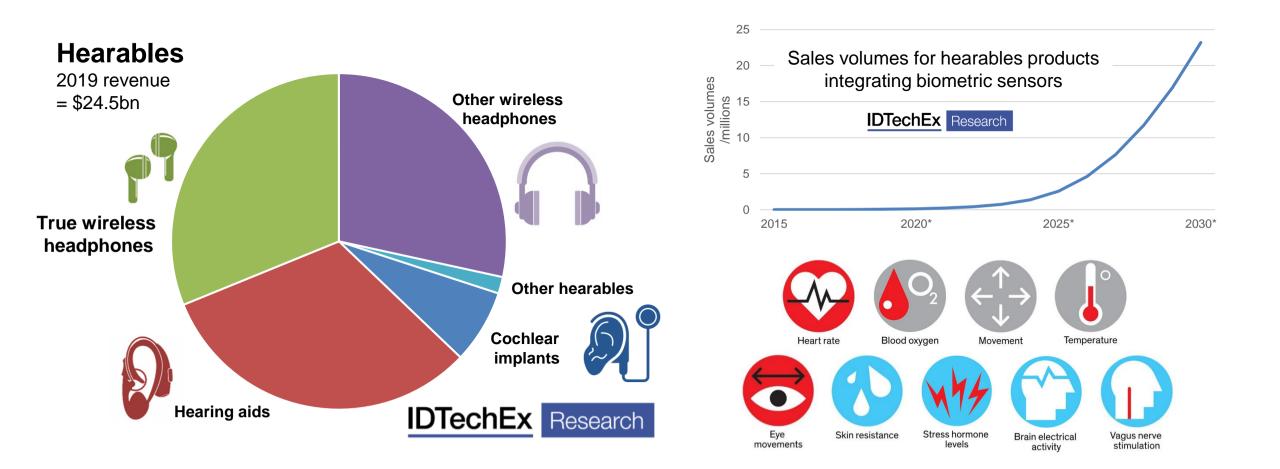
BioTelemetry **LifeSignals**



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Hearables

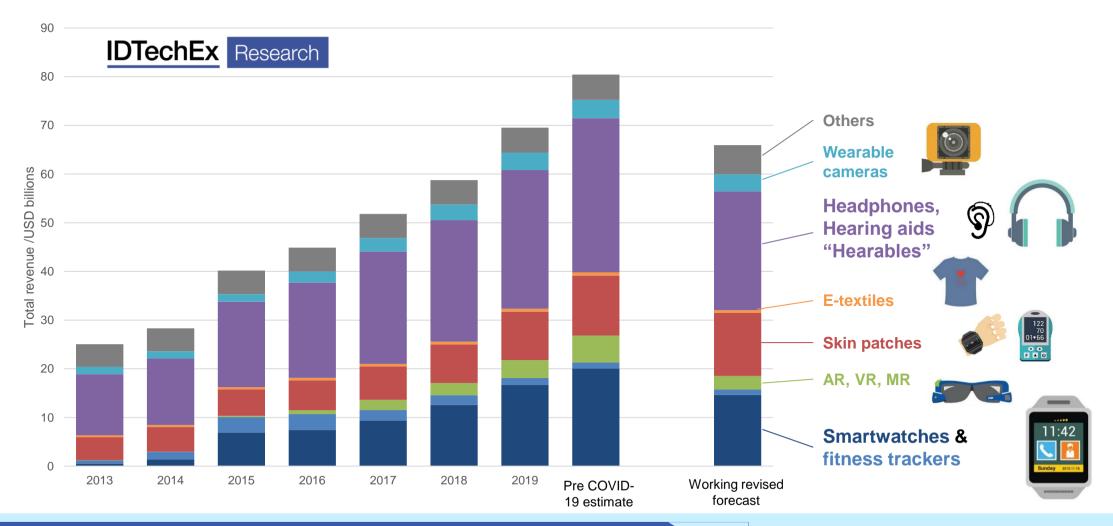


Slide 16



Wearables: State of the Industry

Annual revenue from wearable technology products



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Wearable technology research portfolio from IDTechEx

Report title	Topics covered	Pages	Market data
Wearable Technology Forecasts 2020-2030	Full sector historic market data and forecasts, overviews from other reports and bespoke sections on other products such as smartwatches	269	All: Historic data from 2010-2019
Hearables 2020-2030 Ear-worn products, including headphones, hearing aids, and related areas, plus discussion of underlying industry and technology trends		254	Forecast from 2020-2030 + Impact assessment of COVID-19 (via primer)
Electronic Skin Patches 2020-2030 All products worn on the skin, including continuous glucose monitors, cardiac monitors, remote patient monitoring, electrotherapy, and many more		405	Sub-reports only contain forecasts for relevant products.
Augmented, Mixed and Virtual Reality 2020-2030			
E-textiles & Smart Clothing 2020-2030 Comprehensive review of materials, processes, components, products and the global market		524	IDTechEx Research



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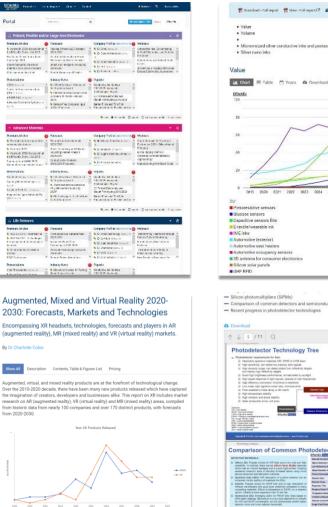


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- As of January 2020

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Value Volume	The key topics discussed in the conferences include the latest development of new energy vehicles (NEVs) as well as the trends and strategies for intelligent and connected vehicles (ICVs).
 Micron-sized silver conductive inks and pastes 	(initia).
Silver nano inks	Download Expand PDF V
Value	↑ ↓ 5 / 26 Q ;
	Market update on the China NEV market
🔟 Chart 🗮 Table 😁 Years 🤷 Download	
100	HEV monthly sales (thousand)
	m NEV monthly sales dropped
10	(compared with 1018 monitority sales) see the set of the second s
50	N V
10	6 ano Nei Nei Ano Ano Nei
	Del more (VHC 275mC) Del more (VHC 275mC) Departe Echanica una ambaneca de anticipat homo y seu d'annicase de la <u>Marces</u>
20	
	China NEV market breakdown
2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029	 By Oct 2019, China BEV sales reached 750,000 units, a 15% increase from the same period in 2018; PHEV sales was down 5.7%, reaching 196,000 units.
24	 Set dams 17-14, respiring 110-00 units. Future of the set of t
Piezaresistive sensors	 Gars account for 90% of the NEV market.
Glucose sensors Capacitive sensors film	Market share by powertrain (by Oct 2019) Market share by vehicle categories (by Oct 2019)
E-textile/wearable ink	PCV Commercial Commercial 0.15 unitaria dBV vehicles PPCV 15 15 15 15 15 15 15 15 15 15 15 15 15 1
IMEinks	HEV T
Automotive (exterior)	cau mer
Automotive seat heaters Automotive occupancy sensors	RV 25 Con ARV
3D antenna for consumer electronics	
Silcon solar panels	Date source: OAVIE, Effection
UHF RFID	Conceptible Characteristics in the Amerikanse and Antonicate Street Conceptible Characteristics and State 2 Solid 2
Silicon photomultipliers (SIPMs)	Financials and Industry Landscape
Comparison of common detectors and semiconductor materials	ABCell was founded in 2001 following the research at the Illinois Institute of Technology during the mid
Recent progress in photodetector technologies	BOx with the conduction facility in Chicago operation in 2000. All'all informed RTachEx that they are on
Download St Expand PDF View	growth through until 2014, from 2014 the company struggled after losing a few customers but as of 20 the company is back to a steady growth and expect this to continue going forward. The Chicago facilit
	was expanded in 2019, aiding in the economical production of the battery packs and currently have 45 staff split approximately evenly across the production and research sides of the business. AllCell quoti-
↓ <u>5</u> /11 Q	their revenue to be in the millions of dollars but sub 10s of millions range. AllCell also own 8 patents, with the earliest covering the use of PCMs for battery thermal management
Photodetector Technology Tree	the later ones covering their specific material formulations. IDTechEx were also told that several more patents are in development.
O Alsoytin pacture natives NR, THR or DTR last	AllCell are keen for partnerships to expand the business and in November 2019 it was announced that AllCell have been selected as one of 5 companies for the Shell Game Changer project which is support
D High shreets regist out detect totact two reflectivity largest and the state of t	by the US Department of Energy's Renewable Energy Laboratory (NREL), focusing on fast charging for electric vehicles and the electricity grid. Fast charging of battery packs to 50 % in 10 minutes has been
Comparison the second sec	tested with the aim of going even further. The project will involve trials of this and similar concepts ove 12-1il month period.
D Line week, high signal services mile, remains one of the service	ABCell's PCC technology competes with other cooling technologies such as air, water/glycol and
High temperature stability Description High vibration and shock stability Description	AlDell's PCC technology competes with other cooling technologies such as all, water/glycol and refrigerant cooling, the PCC material offers significant thermal runaway protection compared to these methods and has the borus of being a passive method, eliminating the need for other components lia
Mean production of these outputs Single Tree	methods and has the borus of being a passive method, eliminating the need for other components like fluid pumps and heat exchangers. Immersion cooling is another emerging technology which competen does add icomplexity with fluid pumps and heat exchangers compared to PCC. Additionally, if solid-sta
Control of Contro	does add complexity with fluid pumps and heat exchangers compared to PCC. Additionally, if solid-stat batteries come to production then AllCell's technology (like most cooling technologies) will become obsciete, however solid-state batteries are not likely to be viable in the near future.
Million Control on Con	obsolete, however solid-state batteries are not likely to be viable in the near future.
No i nagro pola dela manaziona In tra segui a balanciare AMC - nali i pola della manazione amente AMC - nali i pola della manazione amente anti CPIS basere allo pola della della Internazione alla della	SWOT Analysis
Cesard Church de Nacementane I avec Thablage. He Balletta	
omparison of Common Photodetectors & Materials	Strengthe Passive cooling avoids extra complexity and weight of packs. Excellent thermal narway containment.
District District District Art Art Art - Bry	Applications in electric bicycles. Steady growth of company through 2019.
Minus (M), Popular circles to 107 Dan da la box cost act (M) Marce Manan Ange Marce Manan	Selection for Shell Garve Changer project with NREL.
Analysis search are a device S-based lance any real	No applications to automotive sector. Struggled from 2014-2018 with loss of customers.
Generalisen diete (SDIE) Alle elementation of a science director taxe by Declaration of the data (SDIE) and pact of the data (SDIE)	Likely to remain a niche technology.
a second repose these to try their set to try assertion at interest was set out and understitute command to trace Repose The Part Motor Verhalt	Opportunities Expansion of Chicago facility makes battery packs more economical to manufacture. Shell Game Changer project if successful could promote AlDell significantly.
comparing manufacts. Elitors is insurcement to SV/R; not a disector. Academ Deale Company. Mar. Mar. Law.	If thermal runaway regulation shifts to cell to cell to cell the PCC could find more application.





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Research Reports



Wearable Technology

- Wearable Technology Forecasts Overview Report
- Advanced Wound Care Technologies
- Augmented, Mixed and Virtual Reality
- E-textiles and Smart Clothing
- Electronic Skin Patches
- Haptics
- Hearables
- Voice, Speech, Conversation-Based User Interfaces
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- Wearable Technology for Animals







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James Hayward Research@IDTechEx.com

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