TROY TECHNICAL

BIOSENSORS

WEEKLY REPORT

November 14 - November 20, 2026 | Issue 2026-W46

Analytical validity, clinical utility, workflow fit and reimbursement

11	10
ANALYZED ARTICLES	PRIORITY THEMES

Issued 2026-11-20 | English edition | fixed approved cover artwork



Biosensors: the boundary moved from isolated claims to qualification evidence

11 English articles were reviewed independently from the Japanese edition. Ten themes are retained for management decisions.

SIGNAL 01 | BIORECOGNITION

RES-Q Platform: Syringe-Injectable Bioelectronics for Rescue

The Rapid Emergency Subcutaneous (RES-Q) platform integrates wearable sensors with syringe-implantable autoinjectors to provide closed-loop therapeutic rescue.

SIGNAL 02 | TRANSDUCTION

Tandem Mobi: Tubeless AID System Specs and 2027 Timeline

The FDA has cleared a tubeless version of the Tandem Mobi, the world's smallest insulin pump and the first tubeless automated insulin delivery (AID) system wearable for up to seven days.

SIGNAL 03 | DEVICE

RT-LAMP-LFA: Rapid Detection of 2026 Bundibugyo Virus Strain

Researchers have developed a rapid molecular assay combining reverse transcription loop-mediated isothermal amplification and a lateral flow assay (RT-LAMP-LFA) to detect the 2026 Bundibugyo virus (BDBV) outbreak strain.

SIGNAL 04 | CLINICAL WORKFLOW

TiraSpot AI: Universal LFA Interpretation and Digital Reporting

A universal AI model integrated into the TiraSpot smartphone application enables the standardized digitization and interpretation of various lateral flow assays (LFAs).

DECISION

Focus this week's management attention on analytical validity, clinical utility, workflow fit and reimbursement. Move only when the linked evidence can be reproduced under your own operating conditions.

THREE MANAGEMENT MOVES

1. Buyers: define intended use, comparator, false-result cost and action triggered by each measurement.
2. Suppliers: link sensing materials and devices to calibration, stability, manufacturability and data integrity.
3. Executives: track sample variability, specificity, drift, clinical endpoints, regulation and payment.

EVIDENCE DISCIPLINE

FACT states what the collected English source reports. BUSINESS READ and ACTION are editorial interpretations. UNKNOWN lists information that the source file does not establish. A linked article is not treated as independent confirmation of every claim.

Numbers and evidence anchors that require conditions

99.4%
A03

SOURCE-BOUND CONDITION
The system achieved an overall AUC of 99.4% for second band detection after training with 50 images per LFA type, offering a scalable solution to reduce misinterpretation and improve epidemiological surveillance.

97.8%
A09

SOURCE-BOUND CONDITION
The sensor achieves a 97.8% accuracy rate in identifying seven types of hand gestures via surface electromyography, enabling high-precision human-machine interfaces for VR/AR and prosthetics.

100%
A07

SOURCE-BOUND CONDITION
The system achieves 100% accuracy for true negatives and 91% for true positives, enabling same-day diagnosis and treatment in remote areas.

HOW TO USE THESE NUMBERS
Each value is shown with the condition stated in the collected English article. Do not compare values across different test methods, device sizes, operating temperatures or commercial stages without normalizing those conditions.

Where the value chain moved

Each stage combines one leading theme and one supporting theme. The report treats handoffs as evidence transfers, not decorative arrows.

1

Biorecognitio n

P01/P06

The Rapid Emergency Subcutaneous (RES-Q) platform integrates wearable sensors with syringe-implantable autoinjectors to.

2

Transduction

P02/P07

The FDA has cleared a tubeless version of the Tandem Mobi, the world's smallest insulin pump and the first tubeless automated.

3

Device

P03/P08

Researchers have developed a rapid molecular assay combining reverse transcription loop-mediated isothermal amplificati on and.

4

Clinical workflow

P04/P09

A universal AI model integrated into the TiraSpot smartphone application enables the standardized digitization and.

5

Data & reimb ursement

P05/P10

Researchers at the University of Tokyo have developed a conductive nano-mesh skin sensor that can be deposited directly onto.

EVIDENCE REQUIRED AT EACH HANDOFF

Biorecognition to Transduction	Transfer test conditions, acceptance criteria, failure data, owner and decision date. Recheck sample variability, specificity, drift, clinical endpoints, regulation and payment.
Transduction to Device	Transfer test conditions, acceptance criteria, failure data, owner and decision date. Recheck sample variability, specificity, drift, clinical endpoints, regulation and payment.
Device to Clinical workflow	Transfer test conditions, acceptance criteria, failure data, owner and decision date. Recheck sample variability, specificity, drift, clinical endpoints, regulation and payment.
Clinical workflow to Data & reimbursement	Transfer test conditions, acceptance criteria, failure data, owner and decision date. Recheck sample variability, specificity, drift, clinical endpoints, regulation and payment.

COMMON CONTROL POINT

No theme moves to a commercial commitment until a named owner has reproduced the relevant evidence and documented sample variability, specificity, drift, clinical endpoints, regulation and payment.

Priority map: maturity and next decision locus



P01	RES-Q Platform: Syringe-Injectable Bioelectronics for Rescue System / adoption | cue: Platform
P02	Tandem Mobi: Tubeless AID System Specs and 2027 Timeline System / adoption | cue: System
P03	RT-LAMP-LFA: Rapid Detection of 2026 Bundibugyo Virus Strain Business / rules | cue: infrastructure
P04	TiraSpot AI: Universal LFA Interpretation and Digital Reporting Business / rules | cue: standardized
P05	Nano-mesh Skin Sensors: University of Tokyo's 2026 VR/AR Interface Tech / process | cue: no system/business cue
P06	Differential Aptalyzer: Continuous cTnI Monitoring via Biosensor Tech / process | cue: no system/business cue
P07	DASH MTB Assay: Rapid Tuberculosis Testing via Tongue Swabs System / adoption | cue: system
P08	FMWP Wearable Patch: Iontronic Sensing and Wireless Readout Specs System / adoption | cue: integrates
P09	PPy@Ti3C2 Nanocomposite: Sensitive Pb2+ Detection Specs 2026 Tech / process | cue: no system/business cue
P10	Dual-line LFIA for AFP and CEA: ML-assisted screening specs System / adoption | cue: system

REPRODUCIBLE POSITIONING RULE

Horizontal position uses five discrete stages: Research, Prototype, Joint evaluation, Product adoption and Scale. The vertical bands classify the next decision locus: Tech / process, System / adoption, or Business / rules (including supply systems). Article-title cues take precedence; the overview is used only when the title is silent. These are categories, not impact ranks. Bubble diameter reflects the editorial score.

FACT is source-bound. BUSINESS READ, ACTION and UNKNOWN are explicit editorial layers.

P01 RES-Q Platform: Syringe-Injectable Bioelectronics for Rescue

A04 | Biorecognition | Research

Prior release 2026-11-12

FACT

The Rapid Emergency Subcutaneous (RES-Q) platform integrates wearable sensors with syringe-implantable autoinjectors to provide closed-loop therapeutic rescue. In rat models, the system detected fentanyl overdoses and performed autonomous, dose-titratable rescue in under 6 minutes.

WHY IT MATTERS

The decision relevance is analytical validity, clinical utility, workflow fit and reimbursement. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, link sensing materials and devices to calibration, stability, manufacturability and data integrity.

ACTION

Within 30 days, define intended use, comparator, false-result cost and action triggered by each measurement; record the evidence and owner against P01.

UNKNOWN

Still unproven or incompletely stated: sample variability, specificity, drift, clinical endpoints, regulation and payment.

EDITORIAL SCORE 20/25 | MATURITY 1/5 | DECISION LOCUS: SYSTEM / ADOPTION

P02 Tandem Mobi: Tubeless AID System Specs and 2027 Timeline

A06 | Transduction | Research

2026-11-17

FACT

The FDA has cleared a tubeless version of the Tandem Mobi, the world's smallest insulin pump and the first tubeless automated insulin delivery (AID) system wearable for up to seven days. This update allows users to switch between tubed and tubeless configurations using the Control-IQ+ algorithm, expanding flexibility for T1D and T2D patients.

WHY IT MATTERS

The decision relevance is analytical validity, clinical utility, workflow fit and reimbursement. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, link sensing materials and devices to calibration, stability, manufacturability and data integrity.

ACTION

Within 30 days, define intended use, comparator, false-result cost and action triggered by each measurement; record the evidence and owner against P02.

UNKNOWN

Still unproven or incompletely stated: sample variability, specificity, drift, clinical endpoints, regulation and payment.

EDITORIAL SCORE 20/25 | MATURITY 1/5 | DECISION LOCUS: SYSTEM / ADOPTION

FACT is source-bound. BUSINESS READ, ACTION and UNKNOWN are explicit editorial layers.

P03 RT-LAMP-LFA: Rapid Detection of 2026 Bundibugyo Virus Strain

A01 | Device | Pilot

Prior release 2026-11-12

FACT

Researchers have developed a rapid molecular assay combining reverse transcription loop-mediated isothermal amplification and a lateral flow assay (RT-LAMP-LFA) to detect the 2026 Bundibugyo virus (BDBV) outbreak strain. The system detects viral RNA at concentrations as low as 10 3 copies per reaction within 25 minutes. This provides a potential point-of-care diagnostic solution for resource-limited settings where laboratory infrastructure is lacking.

WHY IT MATTERS

The decision relevance is analytical validity, clinical utility, workflow fit and reimbursement. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, link sensing materials and devices to calibration, stability, manufacturability and data integrity.

ACTION

Within 30 days, define intended use, comparator, false-result cost and action triggered by each measurement; record the evidence and owner against P03.

UNKNOWN

Still unproven or incompletely stated: sample variability, specificity, drift, clinical endpoints, regulation and payment.

EDITORIAL SCORE 19/25 | MATURITY 2/5 | DECISION LOCUS: BUSINESS / RULES

P04 TiraSpot AI: Universal LFA Interpretation and Digital Reporting

A03 | Clinical workflow | Research

2026-11-16

FACT

A universal AI model integrated into the TiraSpot smartphone application enables the standardized digitization and interpretation of various lateral flow assays (LFAs). The system achieved an overall AUC of 99.4% for second band detection after training with 50 images per LFA type, offering a scalable solution to reduce misinterpretation and improve epidemiological surveillance.

WHY IT MATTERS

The decision relevance is analytical validity, clinical utility, workflow fit and reimbursement. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, link sensing materials and devices to calibration, stability, manufacturability and data integrity.

ACTION

Within 30 days, define intended use, comparator, false-result cost and action triggered by each measurement; record the evidence and owner against P04.

UNKNOWN

Still unproven or incompletely stated: sample variability, specificity, drift, clinical endpoints, regulation and payment.

EDITORIAL SCORE 19/25 | MATURITY 1/5 | DECISION LOCUS: BUSINESS / RULES

FACT is source-bound. BUSINESS READ, ACTION and UNKNOWN are explicit editorial layers.

P05 Nano-mesh Skin Sensors: University of Tokyo's 2026 VR/AR Interface

A09 | Data & reimbursement | Pilot

2026-11-20

FACT

Researchers at the University of Tokyo have developed a conductive nano-mesh skin sensor that can be deposited directly onto complex body surfaces, including fingertips. The sensor achieves a 97.8% accuracy rate in identifying seven types of hand gestures via surface electromyography, enabling high-precision human-machine interfaces for VR/AR and prosthetics.

WHY IT MATTERS

The decision relevance is analytical validity, clinical utility, workflow fit and reimbursement. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, link sensing materials and devices to calibration, stability, manufacturability and data integrity.

ACTION

Within 30 days, define intended use, comparator, false-result cost and action triggered by each measurement; record the evidence and owner against P05.

UNKNOWN

Still unproven or incompletely stated: sample variability, specificity, drift, clinical endpoints, regulation and payment.

EDITORIAL SCORE 19/25 | MATURITY 2/5 | DECISION LOCUS: TECH / PROCESS

P06 Differential Aptalyzer: Continuous cTnI Monitoring via Biosensor

A08 | Biorecognition | Pilot

2026-11-18

FACT

Researchers in Canada have developed a wearable biosensor capable of continuous monitoring of cardiac troponin I (cTnI) using skin interstitial fluid. The device achieved a clinically relevant sensitivity range of 0.003-0.640 ng/mL, offering a potential shift from episodic blood tests to dynamic assessment of myocardial injury.

WHY IT MATTERS

The decision relevance is analytical validity, clinical utility, workflow fit and reimbursement. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, link sensing materials and devices to calibration, stability, manufacturability and data integrity.

ACTION

Within 30 days, define intended use, comparator, false-result cost and action triggered by each measurement; record the evidence and owner against P06.

UNKNOWN

Still unproven or incompletely stated: sample variability, specificity, drift, clinical endpoints, regulation and payment.

EDITORIAL SCORE 19/25 | MATURITY 2/5 | DECISION LOCUS: TECH / PROCESS

FACT is source-bound. BUSINESS READ, ACTION and UNKNOWN are explicit editorial layers.

P07 DASH MTB Assay: Rapid Tuberculosis Testing via Tongue Swabs

A07 | Transduction | Pilot

2026-11-19

FACT

Northwestern University engineers developed the DASH MTB assay, a point-of-care test that detects Mycobacterium tuberculosis from tongue swabs or sputum in 20 minutes. The system achieves 100% accuracy for true negatives and 91% for true positives, enabling same-day diagnosis and treatment in remote areas.

WHY IT MATTERS

The decision relevance is analytical validity, clinical utility, workflow fit and reimbursement. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, link sensing materials and devices to calibration, stability, manufacturability and data integrity.

ACTION

Within 30 days, define intended use, comparator, false-result cost and action triggered by each measurement; record the evidence and owner against P07.

UNKNOWN

Still unproven or incompletely stated: sample variability, specificity, drift, clinical endpoints, regulation and payment.

EDITORIAL SCORE 19/25 | MATURITY 2/5 | DECISION LOCUS: SYSTEM / ADOPTION

P08 FMWP Wearable Patch: Iontronic Sensing and Wireless Readout Specs

A05 | Device | Pilot

Prior release 2026-11-13

FACT

Researchers have developed a Flexible Miniaturized Wearable Patch (FMWP) that integrates an iontronic pressure sensor with a wireless readout circuit to monitor physiological signals. The device achieves a wide linear range of 2-450 kPa and high sensitivity, enabling real-time smartphone-based monitoring of pulse, respiration, cardiac microvibrations, and swallowing.

WHY IT MATTERS

The decision relevance is analytical validity, clinical utility, workflow fit and reimbursement. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, link sensing materials and devices to calibration, stability, manufacturability and data integrity.

ACTION

Within 30 days, define intended use, comparator, false-result cost and action triggered by each measurement; record the evidence and owner against P08.

UNKNOWN

Still unproven or incompletely stated: sample variability, specificity, drift, clinical endpoints, regulation and payment.

EDITORIAL SCORE 19/25 | MATURITY 2/5 | DECISION LOCUS: SYSTEM / ADOPTION

FACT is source-bound. BUSINESS READ, ACTION and UNKNOWN are explicit editorial layers.

P09 PPy@Ti3C2 Nanocomposite: Sensitive Pb2+ Detection Specs 2026

A11 | Clinical workflow | Pilot

2026-11-19

FACT

Researchers have developed a polypyrrole-functionalized Ti3C2 MXene nanocomposite electrode for the sensitive electrochemical detection of lead (Pb2+) ions in water. The sensor achieves a detection limit of 0.09 µM and a linear response range from 2 to 20 µM. This material provides a reliable method for monitoring toxic heavy metal ions in aqueous environments.

WHY IT MATTERS

The decision relevance is analytical validity, clinical utility, workflow fit and reimbursement. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, link sensing materials and devices to calibration, stability, manufacturability and data integrity.

ACTION

Within 30 days, define intended use, comparator, false-result cost and action triggered by each measurement; record the evidence and owner against P09.

UNKNOWN

Still unproven or incompletely stated: sample variability, specificity, drift, clinical endpoints, regulation and payment.

EDITORIAL SCORE 19/25 | MATURITY 2/5 | DECISION LOCUS: TECH / PROCESS

P10 Dual-line LFIA for AFP and CEA: ML-assisted screening specs

A02 | Data & reimbursement | Research

2026-11-19

FACT

A lightweight machine learning-assisted dual-line lateral flow immunoassay (LFIA) enables simultaneous on-site screening of AFP and CEA biomarkers. The system achieves a classification accuracy of 0.91 for both analytes using a KNN classifier, providing a semi-quantitative basis for clinical screening.

WHY IT MATTERS

The decision relevance is analytical validity, clinical utility, workflow fit and reimbursement. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, link sensing materials and devices to calibration, stability, manufacturability and data integrity.

ACTION

Within 30 days, define intended use, comparator, false-result cost and action triggered by each measurement; record the evidence and owner against P10.

UNKNOWN

Still unproven or incompletely stated: sample variability, specificity, drift, clinical endpoints, regulation and payment.

EDITORIAL SCORE 19/25 | MATURITY 1/5 | DECISION LOCUS: SYSTEM / ADOPTION

Playbook and 0-5 year roadmap

STAKEHOLDER	NOW | 0-30 DAYS	NEXT | 1-12 MONTHS	LATER | 1-5 YEARS
Operating companies	define intended use, comparator, false-result cost and action triggered by each measurement	Run production-like qualification with explicit acceptance and stop criteria.	Build a portfolio and architecture that can absorb technology and supplier changes.
Materials, equipment and technology suppliers	link sensing materials and devices to calibration, stability, manufacturability and data integrity	Create shared reliability, process-window and failure-analysis data with customers.	Standardize interfaces, traceability, lifecycle support and recovery services.
Trading, investment and legal teams	Map sample variability, specificity, drift, clinical endpoints, regulation and payment.	Contract for capacity, quality, change notice, liability, alternatives and exit.	Diversify regional, technical and customer concentration risk.

ROADMAP

NOW | 0-30 DAYS
Evidence ledger
Owner: Strategy + quality
Deliverable: claim, source, condition, owner

NOW | 0-30 DAYS
Risk screen
Owner: Procurement + legal
Deliverable: unknowns, alternatives, stop

NEXT | 1-12 MONTHS
Joint qualification
Owner: R&D + supplier
Deliverable: process window and failure data

NEXT | 1-12 MONTHS
Commercial gate
Owner: Business + finance
Deliverable: unit economics and capacity

LATER | 1-5 YEARS
Platform strategy
Owner: Executive team
Deliverable: portfolio and interface roadmap

LATER | 1-5 YEARS
Service layer
Owner: Operations + channel
Deliverable: monitoring, maintenance and recovery

GO / NO-GO GATES

GATE	OWNER	REQUIRED EVIDENCE	NO-GO CONDITION
G1 Evidence	**Quality**	Source, test conditions and reproducibility	No traceable evidence
G2 Integration	**R&D**	Interface, process window and failure analysis	Cannot meet system conditions
G3 Commercial	**Business**	Capacity, total cost, contract and alternatives	Economics or supply cannot be supported
G4 Lifecycle	**Operations**	Monitoring, maintenance, change notice and exit	No accountable operating plan

ANALYZED ARTICLES | ITEMS 01-11

Every title and URL is displayed in full. URLs wrap without shortening and remain clickable. A verified-reference label means the translated HTML did not retain its original source URL.

ID	FULL ARTICLE TITLE	FULL SOURCE / VERIFIED REFERENCE URL - CLICKABLE
A01	RT-LAMP-LFA: Rapid Detection of 2026 Bundibugyo Virus Strain	https://doi.org/10.64898/2026.11.09.765523
A02	Dual-line LFIA for AFP and CEA: ML-assisted screening specs	https://doi.org/10.21203/rs.3.rs-11475122/v1
A03	TiraSpot AI: Universal LFA Interpretation and Digital Reporting	https://doi.org/10.1371/journal.pgph.0005817
A04	RES-Q Platform: Syringe-Injectable Bioelectronics for Rescue	https://doi.org/10.64898/2026.11.10.765435
A05	FMWP Wearable Patch: Iontronic Sensing and Wireless Readout Specs	https://doi.org/10.21203/rs.3.rs-11075373/v1
A06	Tandem Mobi: Tubeless AID System Specs and 2027 Timeline	https://beyondtype1.org/fda-clears-tubeless-tandem-mobi/
A07	DASH MTB Assay: Rapid Tuberculosis Testing via Tongue Swabs	https://clpmag.com/disease-states/infectious-diseases/tuberculosis/tongue-swab-tuberculosis-test-delivers-results-20-minutes/
A08	Differential Aptalyzer: Continuous cTnI Monitoring via Biosensor	https://www.insideprecisionmedicine.com/topics/precision-medicine/wearable-biosensor-enables-continuous-monitoring-of-cardiac-troponin-i/
A09	Nano-mesh Skin Sensors: University of Tokyo's 2026 VR/AR Interface	https://www.moguravr.com/tokyo-univ-nano-mesh/
A10	PFAS Fabric Sensor: OIST's portable detection platform specs	https://bioengineer.org/portable-fabric-sensor-quickly-and-accurately-detects-forever-chemicals-in-water/
A11	PPy@Ti3C2 Nanocomposite: Sensitive Pb2+ Detection Specs 2026	https://bioengineer.org/functionalized-ti3c2-mxene-nanocomposite-enables-sensitive-electrochemical-detection-of-lead-ions/

Biosensors — Selected Articles

Date: 2026-11-21

Articles: 11

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#05 FMWP Wearable Patch: Iontronic Sensing and Wireless Readout Specs

#06 Tandem Mobi: Tubeless AID System Specs and 2027 Timeline

#07 DASH MTB Assay: Rapid Tuberculosis Testing via Tongue Swabs

#08 Differential Aptalyzer: Continuous cTnI Monitoring via Biosensor

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#10 PFAS Fabric Sensor: OIST's portable detection platform specs

#11 PPy@Ti3C2 Nanocomposite: Sensitive Pb2+ Detection Specs 2026

#01 RT-LAMP-LFA: Rapid Detection of 2026 Bundibugyo Virus Strain

Published November 12, 2026 bioRxiv Japan



OVERVIEW

Researchers have developed a rapid molecular assay combining reverse transcription loop-mediated isothermal amplification and a lateral flow assay (RT-LAMP-LFA) to detect the 2026 Bundibugyo virus (BDBV) outbreak strain. The system detects viral RNA at concentrations as low as 10 3 copies per reaction within 25 minutes. This provides a potential point-of-care diagnostic solution for resource-limited settings where laboratory infrastructure is lacking.

IN DEPTH

Key Findings

The developed RT-LAMP-LFA assay successfully detects the 2026 Bundibugyo virus (BDBV) outbreak strain with high analytical specificity and sensitivity. The total workflow, excluding sample preparation, is completed within 25 minutes. The assay demonstrated the ability to detect BDBV viral RNA at concentrations as low as 10 3 copies per reaction.

Technical Details

The diagnostic process utilizes LAMP primers designed specifically based on the genome sequence of the 2026 outbreak strain. The conservation of these primer binding sites was confirmed in silico across all available 2026 outbreak genomes. To verify performance, the researchers tested the primers using:

- In vitro-transcribed RNA (ivtRNA) from BDBV and other filoviruses.
- RNA derived from mammalian cells and arboviruses.

Amplification products are detected using a Chromatography-Printed Array Strip (C-PAS) lateral flow platform. Testing confirmed that the primers specifically detect BDBV RNA without nonspecific amplification of other viral or cellular RNA samples.

Background and Context

Bundibugyo virus is a filovirus that causes Ebola disease. The 2026 outbreak has highlighted a critical need for rapid diagnostic tools that can be deployed in environments with limited laboratory infrastructure. Traditional molecular tests often require specialized equipment, which restricts access to testing in remote or resource-limited settings.

Significance and Outlook

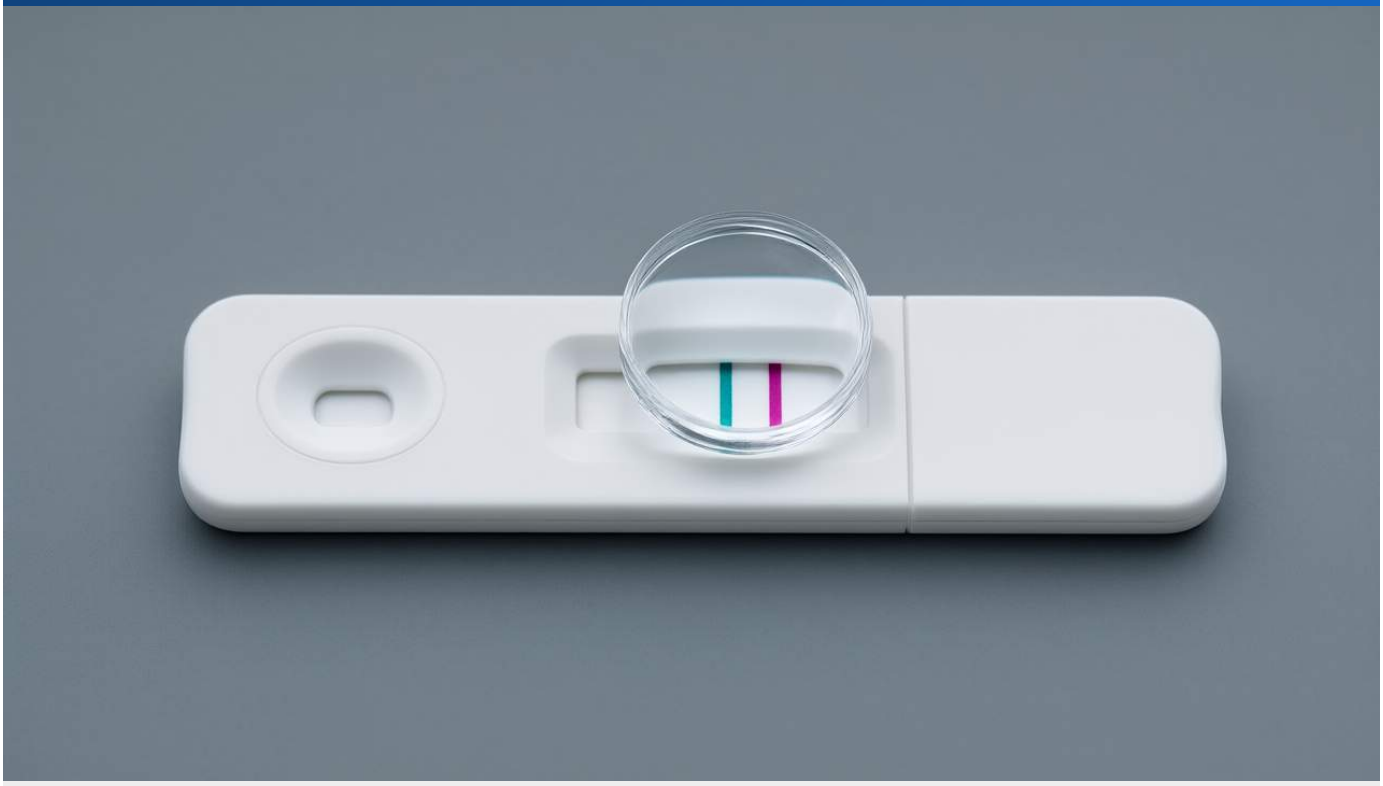
The integration of RT-LAMP with the C-PAS visual detection platform enables a simplified, rapid approach to BDBV detection. By reducing the reliance on complex laboratory infrastructure, this method supports potential application as a point-of-care tool for outbreak response. The researchers note that further evaluation using clinical specimens and field conditions is required to establish the practical applicability and diagnostic performance of the assay.

Source: https://doi.org/10.64898/2026.11.09.765523

Collected: November 21, 2026 | Automated Research System (AI)

#02 Dual-line LFIA for AFP and CEA: ML-assisted screening specs

Published November 19, 2026 Research Square



OVERVIEW

A lightweight machine learning-assisted dual-line lateral flow immunoassay (LFIA) enables simultaneous on-site screening of AFP and CEA biomarkers. The system achieves a classification accuracy of 0.91 for both analytes using a KNN classifier, providing a semi-quantitative basis for clinical screening.

IN DEPTH

Key Findings

The dual-line LFIA system demonstrates high analytical specificity and accuracy in the simultaneous detection of AFP and CEA. Using a KNN classifier with background-corrected RGB features, the system achieved an overall classification accuracy of 0.91 for both CEA and AFP. For CEA, the macro-averaged precision, recall, and F1-score were 0.92, 0.90, and 0.90, respectively; for AFP, these values were 0.93, 0.92, and 0.91. Quantitative analysis via Gaussian Process Regression (GPR) models yielded an R^2 of 0.932 for CEA (MSE = 84.455) and 0.902 for AFP (MSE = 121.506) on an independent test set.

Technical Details

The system utilizes antibody-conjugated gold nanoparticles (AuNPs) as probes. Transmission electron microscopy (TEM) confirmed that antibody conjugation did not substantially alter the oval morphology or colloidal stability of the AuNPs, though UV–vis absorption spectra showed a slight red shift in the localized surface plasmon resonance peak. Optimization determined the ideal antibody loading amount to be 6 μg mL^{-1} for both AFP and CEA, with signal plateaus reached after approximately 10 min.

- **Feature Extraction:** Background-corrected RGB features were selected over T/C intensity ratios and RGB feature intensity due to superior robustness against illumination variation.
- **Repeatability:** For CEA, the coefficient of variation (CV) decreased from 26.3% at 10 ng mL^{-1} to 0.13% at 100 ng mL^{-1}. For AFP, CV values were 11.15%, 7.06%, and 3.40% at 10, 50, and 100 ng mL^{-1}, respectively.
- **Recoveries:** CEA recoveries were 115.0%, 84.7%, and 78.4% across the tested concentrations; AFP recoveries were 126.2%, 109.0%, and 72.4%.

Significance and Outlook

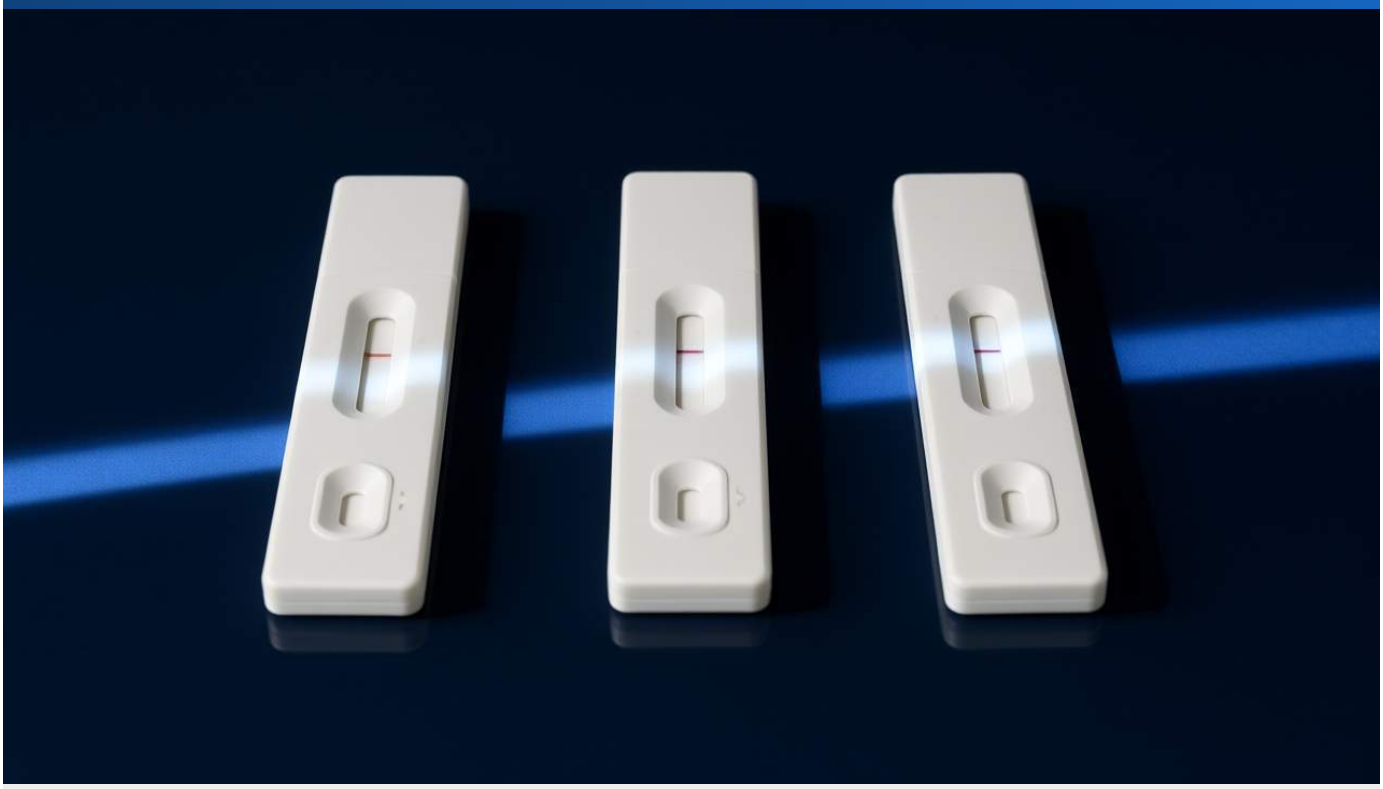
The integration of a smartphone-machine-learning workflow improves the interpretation of LFIA results at both interval and continuous concentration levels. By overcoming the limitations of visual reading, the GPR and KNN models provide a reliable semi-quantitative basis for screening-oriented decisions, reducing the impact of background heterogeneity and illumination variation in on-site environments.

Source: https://doi.org/10.21203/rs.3.rs-11475122/v1

Collected: November 21, 2026 | Automated Research System (AI)

#03 TiraSpot AI: Universal LFA Interpretation and Digital Reporting

Published November 16, 2026 PLOS Global Public Health USA



OVERVIEW

A universal AI model integrated into the TiraSpot smartphone application enables the standardized digitization and interpretation of various lateral flow assays (LFAs). The system achieved an overall AUC of 99.4% for second band detection after training with 50 images per LFA type, offering a scalable solution to reduce misinterpretation and improve epidemiological surveillance.

IN DEPTH

Key Findings

The AI-powered system demonstrates high accuracy in interpreting results from diverse LFA types. For second band detection, the model achieved an overall AUC of 95.3% for unseen LFA types, which improved to 99.4% (Sensitivity = 98.8%; Specificity = 98.2%) after training with 50 images of each specific LFA type. For third band detection, the system reached an overall AUC of 83.6% for unseen LFAs, increasing to 94.05% (Sensitivity = 93.08%; Specificity = 87.87%) after training with 50 images per type.

Technical Details

The AI algorithm was evaluated across 17 LFA types, encompassing both 2-band and 3-band tests from various manufacturers and for different diseases. The model was trained using a dataset of 22,576 images captured via the TiraSpot mobile application (Spotlab, Madrid, Spain). To ensure robustness, the researchers used diverse smartphone models and various lighting conditions. Generalizability was assessed using leave-one-out cross-validation, where each LFA type was iteratively excluded from training and used for testing, with performance evaluated via bootstrapping on the inference dataset.

Background & Context

Lateral flow assays are critical point-of-care tools for patient management and disease surveillance due to their cost-effectiveness and ease of use. However, the utility of LFAs is often hindered by user errors during execution and result interpretation, as well as a lack of traceability. While the REASSURED concept emphasizes the need for real-time connectivity in diagnostics, the absence of accessible electronic platforms to integrate LFA results into clinical records has historically hampered disease monitoring.

Significance & Outlook

This system provides a feasible path toward a universal digital reader that ensures diagnostic consistency across various infections and capture devices. By digitizing results, the tool supports standardized reporting and quality assurance, particularly in resource-limited or decentralized healthcare settings where consistent data capture is essential for epidemiological surveillance.

Source: https://doi.org/10.1371/journal.pgph.0005817

Collected: November 21, 2026 | Automated Research System (AI)

#04 RES-Q Platform: Syringe-Injectable Bioelectronics for Rescue

Published November 12, 2026 bioRxiv USA



OVERVIEW

The Rapid Emergency Subcutaneous (RES-Q) platform integrates wearable sensors with syringe-implantable autoinjectors to provide closed-loop therapeutic rescue. In rat models, the system detected fentanyl overdoses and performed autonomous, dose-titratable rescue in under 6 minutes.

IN DEPTH

Key Findings

The RES-Q platform enables autonomous, closed-loop medical intervention for rapid-onset morbidities. In animal trials, the system demonstrated the ability to detect fentanyl overdoses using wearable photoplethysmography sensors and execute a rescue operation in less than 6 minutes in rats. Additionally, the system's ionic tissue communication was validated in swine by sequentially triggering multiple implants.

Technical Details

The RES-Q architecture consists of a network of wearable sensors and subcutaneous implants. Key technical specifications include:

- **Administration:** Implants are sized similarly to FDA-approved drug rod implants and fit within 6-gauge needles for outpatient administration.
- **Drug Delivery:** To overcome fibrotic encapsulation, the system utilizes miniature jet injectors capable of delivering human-relevant doses of 0.4 mg of naloxone.
- **Communication:** The implants communicate with wearable sensors via tissue conductivity. This method results in a standby current draw of 25 nA, supporting long-term functionality.

Background and Context

The technology addresses the critical gap in treating conditions like opioid overdoses, where victims are often incapacitated and unable to self-administer life-saving medication such as naloxone before respiratory collapse occurs. While closed-loop systems exist, their bulkiness has previously hindered patient acceptance. RES-Q aims to resolve this by utilizing a miniaturized, injectable form factor.

Significance and Outlook

By combining wearable sensing with an injectable, long-term implant, RES-Q provides a mechanism for bystander-independent intervention. The use of jet injection technology specifically addresses the challenge of implant fibrosis fracture mechanics, ensuring rapid drug uptake despite the body's natural encapsulation response. This network of bioelectronics offers a scalable approach to managing acute medical emergencies through autonomous, dose-titratable delivery.

Source: https://doi.org/10.64898/2026.11.10.765435

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#05 FMWP Wearable Patch: Iontronic Sensing and Wireless Readout Specs

Published November 13, 2026 Research Square



OVERVIEW

Researchers have developed a Flexible Miniaturized Wearable Patch (FMWP) that integrates an iontronic pressure sensor with a wireless readout circuit to monitor physiological signals. The device achieves a wide linear range of 2–450 kPa and high sensitivity, enabling real-time smartphone-based monitoring of pulse, respiration, cardiac microvibrations, and swallowing.

IN DEPTH

Key Findings

The FMWP provides a high-sensitivity (13.5 kPa - 1) and wide linear range (2–450 kPa, R 2 ~ 0.999) for iontronic capacitive sensing. The system is designed to minimize motion-induced drift and limited linearity typically found in wearable wireless sensing patches during daily body movements.

Technical Details

The sensor utilizes a CNT-doped ionic film featuring double-sided irregular microstructures. These structures deform progressively under pressure, which creates a nearly proportional increase in contact area and hybrid ion-electron transport. To stabilize the baseline capacitance and suppress preload contact, the design incorporates a quadrant-grid spacer. This configuration results in a fast dynamic response, with a 6 ms response time and 9 ms relaxation time, and maintains durability over 5,000 loading cycles.

The backend architecture consists of rigid electronic islands connected by serpentine copper traces. This design mechanically limits deformation around functional components to suppress electrical variations caused by movement. Additionally, a patterned porous fiber layer is integrated to ensure breathability and reliable, removable adhesion to the skin.

Background & Context

Continuous monitoring of physiological mechanical signals in clinical and daily settings is often hindered by the deformation of wearable patches. Such deformation typically leads to signal drift and poor linearity, complicating the accuracy of long-term health data collection.

Significance & Outlook

By coupling an iontronic sensor with a mechanically compliant wireless readout, the FMWP enables the real-time monitoring of multiple physiological parameters via smartphone. The ability to track pulse, respiration, cardiac microvibrations, and swallowing makes this a practical platform for long-term health assessment.

Source: https://doi.org/10.21203/rs.3.rs-11075373/v1

Collected: November 21, 2026 | Automated Research System (AI)

#06 Tandem Mobi: Tubeless AID System Specs and 2027 Timeline

Published November 17, 2026 Beyond Type 1 USA



OVERVIEW

The FDA has cleared a tubeless version of the Tandem Mobi, the world's smallest insulin pump and the first tubeless automated insulin delivery (AID) system wearable for up to seven days. This update allows users to switch between tubed and tubeless configurations using the Control-IQ+ algorithm, expanding flexibility for T1D and T2D patients.

IN DEPTH

Key Findings

The FDA has cleared the tubeless Tandem Mobi, establishing it as the first tubeless automated insulin delivery (AID) system that can be worn for up to seven days. The device is characterized as the world's smallest insulin pump capable of both tubed and tubeless wear. A full commercial launch in the U.S. is scheduled for early 2027.

Technical Details

The system transitions from a tubed to a tubeless configuration via a specific tubeless cartridge and infusion set. Key technical specifications include:

- **Wear Duration:** The tubeless infusion set is cleared for up to seven days, while the insulin cartridge is cleared for three days of use.
- **Capacity:** A 200-unit insulin cartridge.
- **Hardware Features:** Inductive wireless charging and IP28 water resistance.
- **Connectivity:** Wireless data uploads to the Tandem Source cloud platform and control via a compatible smartphone app.
- **Operational Flexibility:** Ability to temporarily disconnect for exercise, hot tubs, or saunas.

The system utilizes Control-IQ+ technology, which integrates compatible continuous glucose monitor (CGM) readings to predict glucose levels 30 minutes in advance. It adjusts basal insulin every five minutes and delivers automatic correction boluses up to once per hour for readings above 180mg/dL.

Background and Context

Control-IQ+ is cleared for individuals with type 1 diabetes (T1D) aged 2 and older, and adults with type 2 diabetes (T2D) aged 18 and older. While the original Control-IQ was FDA-approved in 2019 and the Tandem Mobi in 2023, the tubeless option addresses long-standing user requests for increased wear flexibility.

Significance and Outlook

The introduction of the tubeless option provides a direct alternative to the Omnipod 5 system. For existing Tandem Mobi users, the upgrade does not require a new pump or a new prescription, as the current hardware is compatible with the new cartridges and infusion sets.

Source: https://beyondtype1.org/fda-clears-tubeless-tandem-mobi/

Collected: November 21, 2026 | Automated Research System (AI)

#07 DASH MTB Assay: Rapid Tuberculosis Testing via Tongue Swabs

Published November 19, 2026 Clinical Lab Products USA



OVERVIEW

Northwestern University engineers developed the DASH MTB assay, a point-of-care test that detects Mycobacterium tuberculosis from tongue swabs or sputum in 20 minutes. The system achieves 100% accuracy for true negatives and 91% for true positives, enabling same-day diagnosis and treatment in remote areas.

IN DEPTH

Key Findings

The DASH MTB assay provides tuberculosis diagnosis within 20 minutes using either sputum or tongue swab specimens. In comparative studies, the test's performance matched that of the Xpert MTB/RIF Ultra molecular test, reaching 100% accuracy on true negative tests and 91% accuracy on true positive results.

Technical Details

The assay operates on the DASH (Diagnostic Analyzer for Specific Hybridization) Rapid PCR System, a point-of-care device developed at Northwestern University. The workflow is designed for environments lacking laboratory infrastructure, requiring non-lab personnel to perform three processing steps before loading a test cartridge into the analyzer for automated detection.

- **Specimen Versatility:** While sputum is the preferred specimen due to higher bacterial loads, the assay supports tongue swabs for patients unable to produce sputum.
- **Environmental Resilience:** Test cartridges demonstrated storage stability at temperatures up to 113 F (45 C), making the system viable in regions with inconsistent electricity or refrigeration.
- **Ease of Use:** Tongue swab collection requires minimal training and can be performed on nearly all patients.

Background & Context

Traditional tuberculosis diagnosis often relies on bacterial culture, which is sensitive but time-consuming and prone to contamination. Furthermore, sputum collection via coughing can expose healthcare workers to infected air droplets. According to the World Health Organization, 1.23 million people died from tuberculosis in 2024, with the highest burden in impoverished areas with limited access to medical facilities.

Significance & Outlook

By enabling results within a single clinic visit, the DASH MTB assay addresses the "weakest link" in tuberculosis care: the diagnosis phase. The project, supported by the National Institutes of Health and the Gates Foundation, was led by Sally McFall of the Center for Innovation in Global Health Technologies. This work builds on previous point-of-care developments for hepatitis C and COVID, and collaborations with the University of Cape Town, Stellenbosch University, and the University of Washington.

Source: https://clpmag.com/disease-states/infectious-diseases/tuberculosis/tongue-swab-tuberculosis-test-delivers-results-20-minutes/

Collected: November 21, 2026 | Automated Research System (AI)

#08 Differential Aptalyzer: Continuous cTnI Monitoring via Biosensor

Published November 18, 2026 Inside Precision Medicine Canada



OVERVIEW

Researchers in Canada have developed a wearable biosensor capable of continuous monitoring of cardiac troponin I (cTnI) using skin interstitial fluid. The device achieved a clinically relevant sensitivity range of 0.003–0.640 ng/mL, offering a potential shift from episodic blood tests to dynamic assessment of myocardial injury.

IN DEPTH

Key Findings

The Differential Aptalyzer, a wearable biosensor developed by a team led by Professor Leyla Soleymani, enables the continuous tracking of cardiac troponin I (cTnI), a critical biomarker for heart muscle injury. In validation tests reported in Science Advances, the platform selectively detected cTnI across a broad dynamic range of 0.003–0.640 ng/mL. In vivo testing using healthy mice showed that the device reliably detected dose-dependent fluctuations in cTnI, producing results consistent with serial blood sampling immunoassays. Additionally, the sensor successfully detected endogenously elevated cTnI in a mouse model of coronary artery disease.

Technical Details

The technology overcomes the difficulty of sensing low-abundance proteins by combining high-affinity capture probes with a reversible signal transduction system. The device architecture includes:

- **Hydrogel Microneedle Patch:** Microscopic polymer needles penetrate just beneath the skin to collect interstitial fluid and deliver it to the sensor.
- **Sensing System:** The platform utilizes high-affinity antibodies for the selective capture of cTnI and nucleic acid analogues known as aptamers.
- **Signal Transduction:** The antibody-aptamer combination enables reagentless, continuous electrochemical signal transduction over several days.

Background & Context

Current cardiac monitoring relies on centralized laboratory workflows and repeated blood draws, which can cause diagnostic delays. This is particularly critical for the approximately 300 million people undergoing non-cardiac surgery annually. Around 20% of higher-risk patients experience myocardial injury post-surgery, and 90% of these cases are silent, making them undetectable without blood tests—a significant challenge for patients discharged on the same day.

Significance & Outlook

By shifting from episodic laboratory confirmation to near-continuous monitoring, the platform could reduce emergency department dwell time and allow for earlier escalation to invasive management. The research team is pursuing commercialization through a startup called Aptec Health and has received funding from the Canadian Institutes of Health Research. Future development aims to expand the sensor's capabilities to include other protein targets related to heart failure and myocardial infarction.

Source: https://www.insideprecisionmedicine.com/topics/precision-medicine/wearable-biosensor-enables-continuous-monitoring-of-cardiac-troponin-i/

Collected: November 21, 2026 | Automated Research System (AI)

#09 Nano-mesh Skin Sensors: University of Tokyo's 2026 VR/AR Interface

Published November 20, 2026 Mogura VR News Japan



OVERVIEW

Researchers at the University of Tokyo have developed a conductive nano-mesh skin sensor that can be deposited directly onto complex body surfaces, including fingertips. The sensor achieves a 97.8% accuracy rate in identifying seven types of hand gestures via surface electromyography, enabling high-precision human-machine interfaces for VR/AR and prosthetics.

IN DEPTH

Key Findings

A research group led by Professor Takao Someya, Associate Professor Tomoyuki Yokota, and Specially Appointed Researcher Xiaoping Liang at the University of Tokyo has successfully developed a nano-mesh skin sensor formed directly on the skin. The system demonstrated the ability to detect minute sweating during reading or calculation tasks and real-time pressure during gripping. Furthermore, by analyzing surface electromyography from the forearm using deep learning, the team identified seven different hand gestures with an average accuracy of 97.8%.

Technical Details

The sensor is fabricated using a proprietary ink composed of carbon nanotubes and ethylene-vinyl alcohol copolymer (EVOH), which is biocompatible. The production process utilizes an electrospinning device that sprays and spins conductive fibers with a diameter of approximately 460 nanometers directly onto the skin. This method ensures the mesh conforms to complex 3D curvatures, including the ridges of fingerprints, without wrinkles or gaps.

- **Mechanical Stability:** The sensor maintains stable conductivity after 1,000 cycles of bending and stretching, and after 15 days of immersion in artificial sweat.
- **Breathability:** The porous structure exceeds the breathability of medical tape and allows nearly 100% of thermal radiation to pass through, preventing interference with natural heat dissipation.
- **Application Force:** The force applied to the skin during spinning is equivalent to or less than the sound pressure of normal conversation.

Background and Context

Previous research focused on ultra-thin film sensors, which required fabrication on flat substrates before being transferred to the skin. These film-type sensors often suffered from poor electrical contact due to wrinkles and lifting when applied to highly curved areas like fingertips.

Significance and Outlook

The research, published in *Nature Communications* on November 16, 2026, establishes a new platform for constructing sensors on any part of the body. Potential applications include daily monitoring of vital signs and mental health, as well as intuitive human-machine interfaces for controlling VR/AR devices and prosthetic limbs.

Source: https://www.moguravr.com/tokyo-univ-nano-mesh/

Collected: November 21, 2026 | Automated Research System (AI)

#10 PFAS Fabric Sensor: OIST's portable detection platform specs

Published November 14, 2026 BIOENGINEER.ORG Japan



OVERVIEW

Researchers at the Okinawa Institute of Science and Technology have developed a low-cost, portable electrochemical sensor for the rapid detection of per- and polyfluoroalkyl substances (PFAS) in water. By combining fabric-based disposable electrodes with molecularly imprinted polymers, the system enables on-site monitoring without the need for laboratory-based mass spectrometry.

IN DEPTH

Key Findings

The Okinawa Institute of Science and Technology has engineered a portable sensing platform capable of identifying trace concentrations of "forever chemicals" directly in water. The system utilizes disposable fabric strips paired with a compact potentiostat dongle that connects to a smartphone or laptop, allowing users to bypass the logistical delays associated with conventional external laboratories.

Technical Details

The sensor's core technology relies on molecularly imprinted polymers (MIPs) that act as synthetic antibodies. These polymers are fabricated around target PFAS molecules to create custom molecular pockets; once the templates are removed, the remaining cavities precisely match the shape and dimensions of the target compound. This allows for selective capture without secondary chemical reagents.

The hardware consists of the following components:

- **Fabric Strips:** Disposable electrodes screen-printed onto repurposed fabric. Each strip features three dark electrode prongs coated with compound-specific polymers.
- **Detection Mechanism:** The binding of target molecules to the polymer induces an immediate alteration in electrical current across the electrode surface, where the magnitude of the shift correlates to the PFAS concentration.
- **Interface:** A black potentiostat dongle that plugs into a standard laptop or smartphone to process and display the readings.

Initial experimental validation focused on perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA). The researchers demonstrated the feasibility of high-volume manufacturing by screen-printing 100 electrodes onto fabric in a few hours.

Background & Context

PFAS are synthetic compounds known for extreme stability and resistance to heat, oil, and water. While industrially valuable, they accumulate in soils, waterways, and organisms. The chemical family exceeds 10,000 substances, though only 50 to 150 are currently subject to global environmental regulations. Traditional detection requires field technicians to send samples to labs for mass spectrometry, a process that is costly and labor-intensive.

Significance & Outlook

This decentralized testing approach lowers barriers to environmental remediation. Because the polymer manufacturing is modular, the architecture can be configured to detect other compounds within the broader PFAS spectrum beyond PFOS and PFOA, empowering municipal authorities and private households to make informed remediation choices.

Source: https://bioengineer.org/portable-fabric-sensor-quickly-and-accurately-detects-forever-chemicals-in-water/

Collected: November 21, 2026 | Automated Research System (AI)

#11 PPy@Ti3C2 Nanocomposite: Sensitive Pb2+ Detection Specs 2026

Published November 19, 2026 BIOENGINEER.ORG



OVERVIEW

Researchers have developed a polypyrrole-functionalized Ti3C2 MXene nanocomposite electrode for the sensitive electrochemical detection of lead (Pb2+) ions in water. The sensor achieves a detection limit of 0.09 μM and a linear response range from 2 to 20 μM. This material provides a reliable method for monitoring toxic heavy metal ions in aqueous environments.

IN DEPTH

Key Findings

The modified electrode utilizing a PPy@Ti3C2 nanocomposite demonstrates high sensitivity and selectivity for the detection of toxic lead (Pb^{2+}) ions. Electrochemical testing confirms a linear detection response across concentrations ranging from 2 to 20 μM, with a calculated detection limit of 0.09 μM. The sensor further exhibits dependable operational stability and reproducibility.

Technical Details

The PPy@Ti3C2 nanocomposite was synthesized using an in situ oxidative polymerization process. This method integrates a conductive polymer containing surplus nitrogen directly onto the Ti3C2 MXene structure, ensuring uniform polymer integration and strong interfacial interactions between the phases. Structural and surface analyses confirm that this hybrid material possesses improved electronic properties and an abundant distribution of active sites.

The enhanced sensing performance is attributed to synergistic mechanisms within the material, specifically:

- Interfacial electronic modulation between the conductive polymer and MXene layers.
- Accelerated charge transfer during electrochemical processes.

Background & Context

Lead ions in aqueous environments are a critical concern for researchers because lead is chemically persistent and causes serious health consequences. To address this, the study focused on enhancing sensing capabilities through a mechanically directed functionalization procedure. The research was published in the Journal of Materials Science by Dahiya, Thakur, Sharma, and Binjawhar.

Significance & Outlook

The development of the PPy@Ti3C2 nanocomposite offers an accessible and efficient strategy for MXene functionalization. By improving the electronic properties and active site distribution of the electrode, this method enables the reliable electrochemical monitoring of heavy metal ions in water, providing a technical solution for detecting persistent environmental toxins.

Source: https://bioengineer.org/functionalized-ti3c2-mxene-nanocomposite-enables-sensitive-electrochemical-detection-of-lead-ions/

Collected: November 21, 2026 | Automated Research System (AI)