

The slide features two large, solid purple geometric shapes. One is a large triangle on the left side, pointing towards the bottom right. The other is a smaller, parallelogram-like shape in the top right corner, pointing towards the bottom left.

Jim Bray

Northwestern University

Expert Finder Systems Forum
March 1st, 2019

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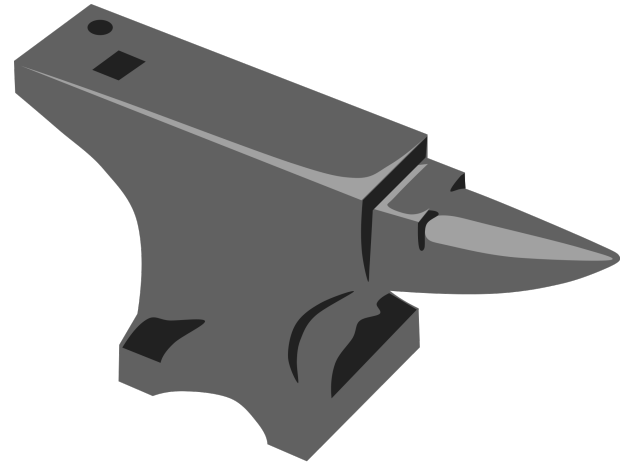
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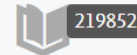
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55

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219852

Research Output



18484

Grants

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Research output: Chapter in Book/Report/Conference proceeding › Conference contribution

11

Citations

☒ Heat Affected Zone ☒ High Strength Steel ☒ Submerged Arc Welding ☒ Copper ☒ Heating

Wear of aluminum-alloy matrix composites in lubricated conformal contact with case hardened steel

Wang, Q. J., Cheng, H. S., Caracostas, C. A. & Fine, M. E., Jan 1 1994, In : *Tribology Transactions*. 37, 4, p. 735-742 8 p.

Research output: Contribution to journal › Article



4

Citations

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Research Output (18)

18 results

Relevance ▾



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Research output: Chapter in Book/Report/Conference proceeding > Conference contribution

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☒ Heat Affected Zone ☒ High Strength Steel ☐ Submerged Arc Welding ☐ Copper ☐ Heating

2 Experts

35 Research Output

1 Grants

Wear of aluminum nitride-coated hardened steel

Composites in lubricated conformal contact with case

Wang, Q. J., Cheng, H. S., Caracostas, C. A. & Fine, M. E., Jan 1 1994, In : *Tribology Transactions*. 37, 4, p. 735-742 8 p.

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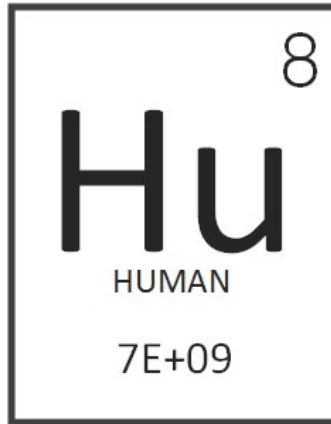
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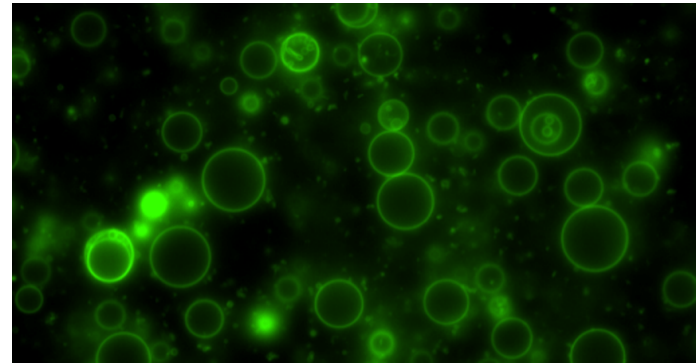
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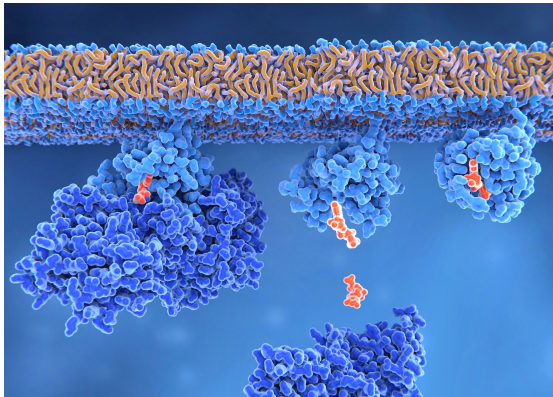
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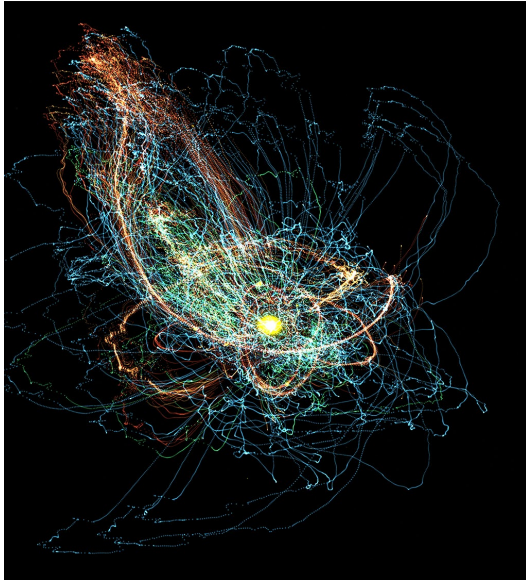
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SCIENCE ADVANCES | RESEARCH ARTICLE

MATERIALS SCIENCE

Battery-free, skin-interfaced microfluidic/electronic systems for simultaneous electrochemical, colorimetric, and volumetric analysis of sweat

Amay J. Bandodkar^{1,2*}, Philipp Gutruf^{1,2,3*}, Jungil Choi^{1,2*}, KunHyuck Lee¹, Yurina Sekine⁴, Jonathan T. Reeder^{1,2}, William J. Jeang^{1,2}, Alexander J. Aranyosi^{2,5}, Stephen P. Lee^{2,5}, Jeffrey B. Model^{2,5}, Roozbeh Ghaffari^{2,5,6}, Chun-Ju Su¹, John P. Leshock⁶, Tyler Ray^{1,2}, Anthony Verrillo¹, Kyle Thomas⁷, Vaishnavi Krishnamurthi⁸, Seungyong Han⁹, Jeonghyun Kim¹⁰, Siddharth Krishnan^{1,11,12}, Tao Hang¹³, John A. Rogers^{1,2,5,10,11,14,15,16,17,18†}

Wearable sweat sensors rely either on electronics for electrochemical detection or on colorimetry for visual readout. Non-ideal form factors represent disadvantages of the former, while semiquantitative operation and narrow scope of measurable biomarkers characterize the latter. Here, we introduce a battery-free, wireless electronic sensing platform inspired by biofuel cells that integrates chronometric microfluidic platforms with embedded colorimetric assays. The resulting sensors combine advantages of electronic and microfluidic functionality in a platform that is significantly lighter, cheaper, and smaller than alternatives. A demonstration device simultaneously monitors sweat rate/loss, pH, lactate, glucose, and chloride. Systematic studies of the electronics, microfluidics, and integration schemes establish the key design considerations and performance attributes. Two-day human trials that compare concentrations of glucose and lactate in sweat and blood suggest a potential basis for noninvasive, semi-quantitative tracking of physiological status.

INTRODUCTION

Thin, soft, wearable sensors that intimately integrate with the human body (17). Comparatively, less emphasis is on real-time and noninvasive mea-

stress/strain and elastic modulus (15), blood flow (16), and hydration

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McCORMICK IN THE MEDIA

Microfluidic Sweat Analysis Device Featured in The New York Times

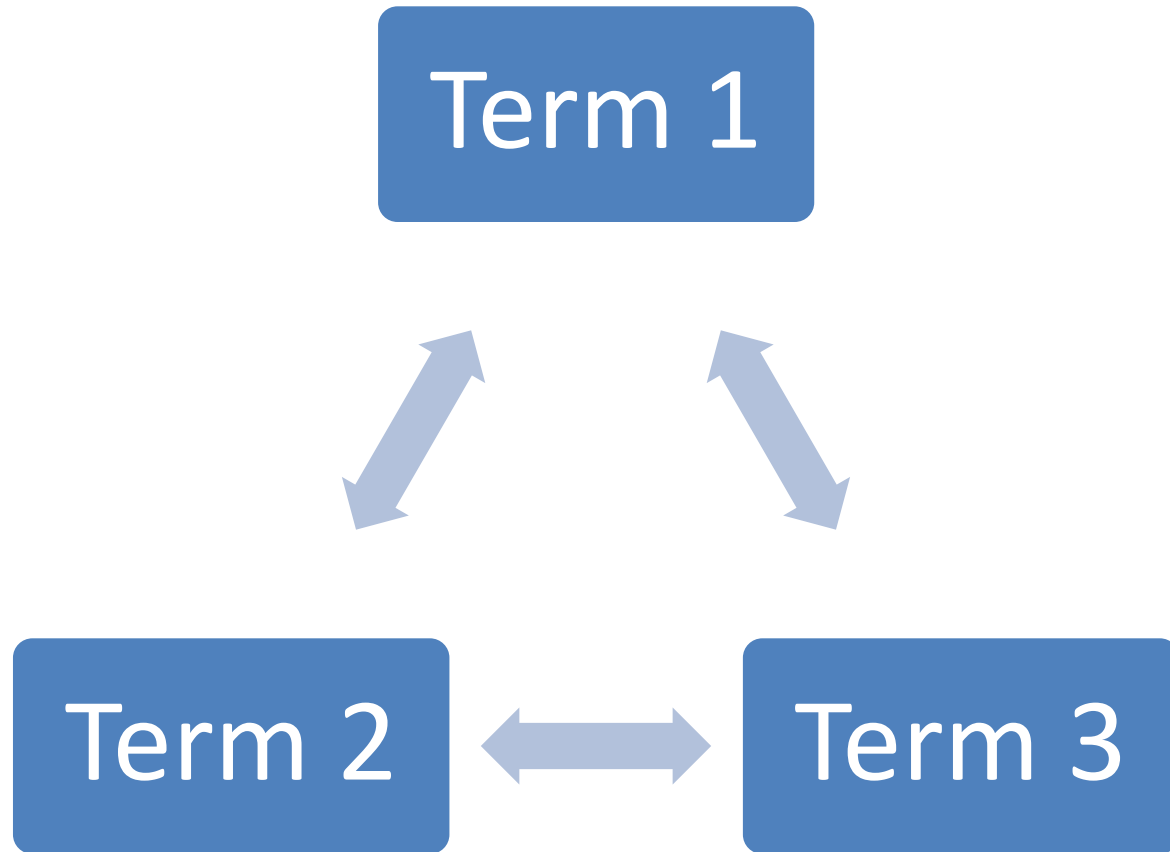
The wireless, battery free device measures hydration, glucose levels

JAN 22, 2019 // ALEX GERAGE

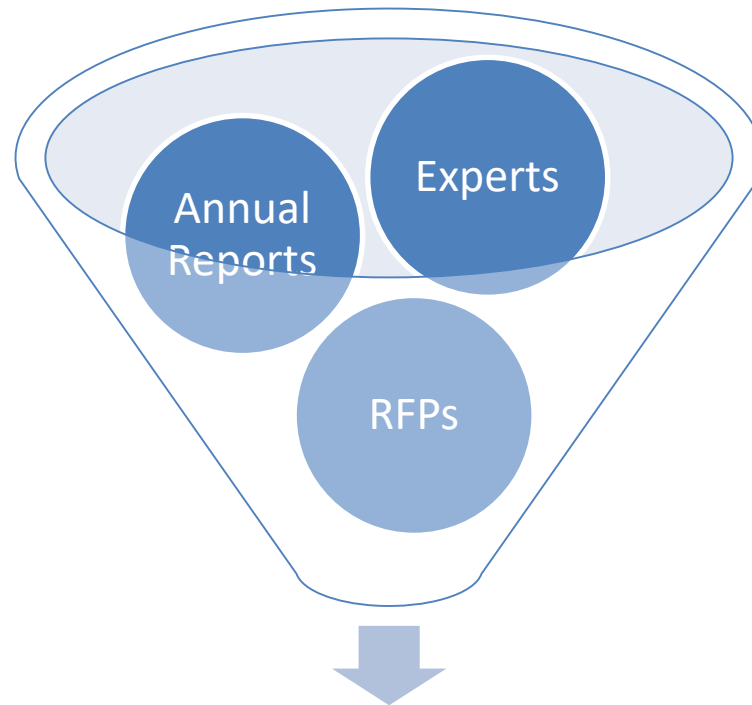


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