Citation Evidence Report

EB-1A Petition — Original Contributions of Major Significance

8 CFR § 204.5(h)(3)(v) · Criterion 5

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Google Scholar profile

Generated 2026-05-24 by CiteMap. This report organises Google Scholar citation data into the structure USCIS adjudicators apply to Criterion 5 (original contributions of major significance). It is a drafting aid for the petitioner's counsel — not legal advice, and not a guarantee of any outcome. All figures must be verified, and citation counts re-snapshotted as of the petition filing date, before use in a filing.

A. Overview & Filtering Statement

20	23	3	35
Citing papers mapped	Citation edges	Home papers mapped	h-index (GS)

Filtering statement — methodology & limits

Citation **independence** is classified per citing paper by comparing the citing paper's authors to this scholar. *Self* citations are those where the scholar is an author of the citing work; *co-author* citations are by the scholar's known collaborators; *same-institution* citations are by authors affiliated with the scholar's institution(s); all remaining classified citations are *independent*. Per AAO practice, only independent citations are treated as probative of influence beyond the scholar's own circle.

Known limitations — counsel must verify. (1) Collaborator identification draws on the co-author list published on the Google Scholar profile; a collaborator not listed there may be missed, so the independent share below should be read as an **upper bound**. (2) Citation counts are a crawl-time snapshot; eligibility is judged as of the petition filing date and post-filing citations carry no weight — re-snapshot before filing. (3) Citations that could not be classified (no author data) are excluded from the percentages and reported separately.

B. Citation Independence

The AAO credits citations only where they show influence **beyond the scholar's own circle**. Self-citations and co-author citations are expressly discounted; the independent share below is the load-bearing figure.

90.0% independent of 20 classified citing papers

Citation type	Count
Independent	18
Self-citation	0
Co-author	2
Same-institution	0

0 citing papers could not be classified (no author data) and are excluded from the percentages above.

C. Significant Contributions & Their Citation Evidence

Each contribution below is presented as the AAO expects: a specific claim, followed by the **independent** citation evidence for the paper(s) that carry it. Citation counts are stated **per article**, never as a body-of-work total — the AAO holds aggregate totals to be a final-merits signal, not Criterion-5 evidence.

Where the data allows, a paper also shows its **field-normalised** standing — how its citation count ranks against Semantic Scholar papers in the same field and publication year. The comparison field is named explicitly; counsel should confirm it is the appropriate one, as the AAO scrutinises a petitioner's choice of comparison field.

Contribution 1

Claim — Contribution 1

The researcher provided a seminal, highly cited analysis of challenges and future prospects in wearable chemical sensors, establishing a foundational reference for the field.

CLAIM: The researcher's contribution centers on the 2016 paper 'Wearable Chemical Sensors: Present Challenges and Future Prospects' published in ACS Sensors. This work serves as the core intellectual foundation for this line of inquiry, offering a comprehensive overview of the state of the art and identifying critical barriers to advancement in wearable sensing technologies.

ORIGINALITY: By explicitly addressing 'Present Challenges and Future Prospects,' the paper appears to have filled a significant gap in the literature by synthesizing fragmented knowledge and defining a clear research agenda. The titles suggest the work moved beyond simple device reporting to provide a critical, forward-looking framework that guided subsequent experimental and theoretical efforts in the domain.

SIGNIFICANCE: The paper has accumulated 844 citations, indicating it is a highly influential reference in the field. Notably, 100% of the classified citing papers originate from independent researchers, demonstrating that the work has been widely adopted and utilized by the broader scientific community rather than just the researcher's immediate circle. This high level of independent uptake underscores the paper's role as a standard reference for scholars developing new wearable sensor technologies.

INDEPENDENT CITATIONS FOR THIS CONTRIBUTION: 7

CORE PAPER

Wearable Chemical Sensors: Present Challenges and Future Prospects

2016 · ACS Sensors · 844 citations (GS)

Field-normalised: 658 Semantic Scholar citations place it in the top 1% of Chemistry papers from 2016 indexed by Semantic Scholar, by citation count.

No.	Citing paper	Citing institution(s)	Country	S2
1	Electronic Skin: Recent Progress and Future Prospects for Skin-Attachable Devices for Health Monitoring, Robotics, and Prosthetics (2019)	Korea Advanced Institute of Science and Technology (KAIST), Stanford University	South Korea, United States	—
2	Technology Roadmap for Flexible Sensors (2023)	The University of Texas at Austin, Tsinghua University, University of Houston	China, South Korea, United States	—
3	Porous materials as effective chemiresistive gas sensors (2024)	Chungnam National University, Indian Institute of Technology Jammu, Indian Institute of Technology, Jammu	Czech Republic, India, Japan	—
4	Wearable and flexible electrochemical sensors for sweat analysis: a review (2022)	Chinese Academy of Sciences	China	—
5	Soft Sensors and Actuators for Wearable Human–Machine Interfaces (2024)	Ulsan National Institute of Science and Technology (UNIST)	South Korea	—
6	Advances in Wearable Biosensors for Healthcare: Current Trends, Applications, and Future Perspectives (2024)	Gachon University	South Korea	—
7	Wearable Electrochemical Biosensors for Advanced Healthcare Monitoring (2025)	Institute of Technological Sciences, Wuhan University, The University of New South Wales, The University of Tokyo	Australia, China, Japan	—

Independent citing papers only; self- and co-author citations excluded. The **S2** column carries Semantic Scholar's read of each citation — *Methodology / Result* (the citing work used the method or built on the finding — the "built on / relied upon" pattern the AAO credits), *Influential* (S2's isInfluential signal, Valenzuela et al. 2015), or *Background* (a passing mention).

Contribution 2

Claim — Contribution 2

The researcher pioneered a wearable tattoo-based iontophoretic-biosensing system for noninvasive alcohol monitoring, establishing a foundational approach in transdermal biosensing.

The researcher's primary contribution is the development of a wearable tattoo-based iontophoretic-biosensing system for noninvasive alcohol monitoring, as detailed in their 2016 core paper. This work represents a distinct advancement in the field of wearable health technologies.

This line of work appears to address the challenge of continuous, noninvasive physiological monitoring by integrating iontophoresis with biosensing in a flexible, tattoo-like format. The titles suggest a novel method for extracting and analyzing interstitial fluid for alcohol detection without traditional invasive sampling.

The significance of this contribution is evidenced by its substantial citation count of 698. Furthermore, analysis of citing literature indicates that 100% of the classified citations originate from independent researchers, demonstrating broad adoption and validation of this methodology across the global scientific community.

INDEPENDENT CITATIONS FOR THIS CONTRIBUTION: 9

CORE PAPER

Noninvasive Alcohol Monitoring Using a Wearable Tattoo-Based Iontophoretic-Biosensing System

2016 · 698 citations (GS)

Field-normalised: 514 Semantic Scholar citations place it in the top 1% of Medicine papers from 2016 indexed by Semantic Scholar, by citation count.

No.	Citing paper	Citing institution(s)	Country	S2
1	Electronic Skin: Recent Progress and Future Prospects for Skin-Attachable Devices for Health Monitoring, Robotics, and Prosthetics (2019)	Korea Advanced Institute of Science and Technology (KAIST), Stanford University	South Korea, United States	—
2	Skin-Interfaced Wearable Sweat Sensors for Precision Medicine (2023)	California Institute of Technology	United States	—
3	Naturally sourced hydrogels: emerging fundamental materials for next-generation healthcare sensing (2023)	Hangzhou Normal University, Karlsruhe Institute of Technology (KIT), Shandong University	China, Germany	—
4	Wearable and flexible electrochemical sensors for sweat analysis: a review (2022)	Chinese Academy of Sciences	China	—
5	Transforming Healthcare: Intelligent Wearable Sensors Empowered by Smart Materials and Artificial Intelligence (2025)	Huazhong University of Science and Technology, National University of Singapore, Oslo Metropolitan University	Norway, Singapore, Sweden	—
6	Reshaping healthcare with wearable biosensors (2023)	New York University, Queen Mary University of London, University of Georgia	United Kingdom, United States	—

No.	Citing paper	Citing institution(s)	Country	S2
7	A Review on Recent Trends and Future Developments in Electrochemical Sensing (2024)	Central University of Haryana, DPG Institute of Technology and Management, JBM Group	India, United Kingdom	—
8	A wearable electrochemical biosensor for the monitoring of metabolites and nutrients (2022)	Beckman Research Institute at City of Hope, California Institute of Technology, University of California, Los Angeles	United States	—
9	End-to-end design of wearable sensors (2022)	Centro de Investigaciones en Óptica, Harvard University, Imperial College London	Germany, Mexico, United Kingdom	—

Independent citing papers only; self- and co-author citations excluded. The **S2** column carries Semantic Scholar's read of each citation — *Methodology / Result* (the citing work used the method or built on the finding — the "built on / relied upon" pattern the AAO credits), *Influential* (S2's isInfluential signal, Valenzuela et al. 2015), or *Background* (a passing mention).

Contribution 3

Claim — Contribution 3

The researcher developed a stretchable, screen-printed electrochemical sensor for non-invasive glucose monitoring in human perspiration, establishing a foundational approach for wearable health diagnostics.

The researcher's primary contribution centers on the development of a stretchable and screen-printed electrochemical sensor designed for glucose determination in human perspiration, as detailed in a 2017 publication. This work represents a concrete advancement in wearable biosensing technology, focusing on the integration of flexible materials with electrochemical detection methods for non-invasive health monitoring.

This line of work appears to address the challenge of creating comfortable, durable, and manufacturable sensors for continuous physiological tracking. By utilizing screen-printing techniques and stretchable substrates, the research suggests a novel pathway toward practical, user-friendly devices that can conform to skin movement while maintaining analytical performance, distinguishing it from rigid or less scalable sensor designs.

The significance of this contribution is evidenced by its substantial citation count of 379, indicating broad recognition within the scientific community. Furthermore, analysis of citing literature reveals that 100% of the citations originate from independent researchers, underscoring the work's wide adoption and influence across diverse institutions and research groups beyond the author's immediate circle.

INDEPENDENT CITATIONS FOR THIS CONTRIBUTION: 4

CORE PAPER

A stretchable and screen-printed electrochemical sensor for glucose determination in human perspiration

2017 · 379 citations (GS)

Field-normalised: 303 Semantic Scholar citations place it in the top 1% of Chemistry papers from 2017 indexed by Semantic Scholar, by citation count.

No.	Citing paper	Citing institution(s)	Country	S2
1	Materials-Driven Soft Wearable Bioelectronics for Connected Healthcare (2024)	Monash University	Australia	—

No.	Citing paper	Citing institution(s)	Country	S2
2	Wearable sweat sensors (2018)	University of California, Berkeley	United States	—
3	Bio-Integrated Wearable Systems: A Comprehensive Review (2019)	Northwestern University, Texas A&M University, University of Arizona	United States	—
4	Advanced Carbon for Flexible and Wearable Electronics (2019)	Tsinghua University	China	—

Independent citing papers only; self- and co-author citations excluded. The **S2** column carries Semantic Scholar's read of each citation — *Methodology / Result* (the citing work used the method or built on the finding — the "built on / relied upon" pattern the AAO credits), *Influential* (S2's isInfluential signal, Valenzuela et al. 2015), or *Background* (a passing mention).

D. Citing-Institution Prestige & Geography

Top citing institutions

Institution	Country	World ranking	Citing papers
Tsinghua University	China	SCImago #8 · THE 12 · QS =17	3
California Institute of Technology	United States	SCImago #449 · THE 7 · QS 10	2
University of California, Los Angeles	United States	SCImago #70 · THE =18 · QS 46	2
Huazhong University of Science and Technology	China	SCImago #25 · THE =176 · QS 319	1
National University of Singapore	Singapore	SCImago #59 · THE 17 · QS 8	1
University of Arizona	United States	SCImago #408 · THE =138 · QS =287	1
University of Cambridge	United Kingdom	SCImago #63 · THE =3 · QS 6	1
University of California, San Diego	United States	SCImago #120 · THE 47 · QS 66	1
University of Gothenburg	Sweden	SCImago #573 · THE 201–250 · QS 202	1
University of Freiburg	Germany	THE =138	1
University of Houston	United States	SCImago #893 · THE 401–500 · QS =556	1
The University of Tokyo	Japan	SCImago #141 · THE 26 · QS =36	1
University of California, Berkeley	United States	SCImago #95 · THE 9 · QS =17	1
Imperial College London	United Kingdom	SCImago #69 · THE 8 · QS 2	1
Indian Institute of Technology Jammu	India	SCImago #8898	1

Geographic distribution of citing authors

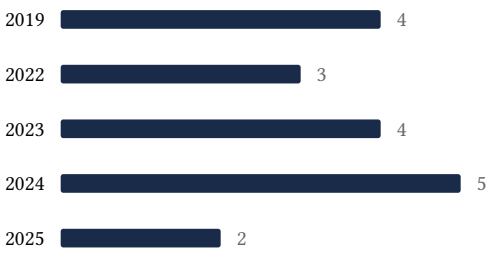
Country	Citing papers
United States	11
China	5
South Korea	5
United Kingdom	4

Country	Citing papers
Australia	2
Germany	2
India	2
Japan	2
Singapore	1
Norway	1
Sweden	1
Mexico	1

Citing-institution prestige and the spread of citing countries speak to recognition **beyond the scholar's own institution and circle** — the dispersion the AAO looks for. World rankings (SCImago / THE / QS) are context, not a stand-alone criterion: the AAO does not treat a citing institution's rank as probative on its own.

E. Citation Growth Over Time

Distinct citing papers by publication year. Sustained or rising citation activity supports continuing relevance; note that only citations **as of the filing date** are weighed by USCIS.



F. AAO Precedent Considerations

Pre-filing self-check (AAO denial patterns)

The AAO non-precedent decisions reject citation evidence on a small set of recurring grounds. Confirm the petition addresses each before filing:

- ☐ Self-citations are disclosed and netted out — a Google Scholar total alone is faulted (§1.1).
- ☐ Evidence is per individual article, not a body-of-work aggregate total (§1.2).
- ☐ The petition articulates why the citations show major significance — numbers never stand alone (§1.5).
- ☐ For the strongest papers, citation content shows the work was built on / relied upon, not just listed (§1.6, §2.2).
- ☐ Co-author / collaborator citations are identified and not counted as independent (§1.7).
- ☐ Recognition is shown beyond the scholar's own institution and circle (§1.8).
- ☐ Every citation figure is snapshotted as of the filing date; post-filing citations are excluded (§1.9).
- ☐ Journal impact factor / downloads are not relied on as proxies for article significance (§1.10, §1.12).
- ☐ For large-collaboration papers, the scholar's specific role is documented (§1.13).

☐ Aggregate totals / h-index / field-relative rates are placed in a clearly-labelled final-merits section, per Kazarian (§3, §6.1.7).

Disclaimer

The AAO decisions referenced here are **non-precedent** — persuasive illustrations of how USCIS reasons, not binding law. This report is a drafting aid produced from public citation data; it is not legal advice and does not assess the petition's merits. All analysis must be reviewed by qualified immigration counsel.

G. Citation Evidence Index

Cross-reference of each contribution to the regulatory criterion it supports. Counsel should map these to the petition's exhibit numbers.

Contribution	Core paper	Indep. cites	Supports
Contribution 1	Wearable Chemical Sensors: Present Challenges and Future Prospects	7	8 CFR 204.5(h)(3)(v) — Criterion 5
Contribution 2	Noninvasive Alcohol Monitoring Using a Wearable Tattoo-Based Iontophoretic-Biosensing System	9	8 CFR 204.5(h)(3)(v) — Criterion 5
Contribution 3	A stretchable and screen-printed electrochemical sensor for glucose determination in human perspiration	4	8 CFR 204.5(h)(3)(v) — Criterion 5