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 2026-05-21 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

95	114	15	4
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.

88.6% independent of 35 classified citing papers

Citation type	Count
Independent	31
Self-citation	3
Co-author	1
Same-institution	0

60 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 pioneered electrochemical ocean carbon capture, establishing a foundational framework that subsequent independent studies have widely adopted and extended.

The researcher's core contribution centers on the 2023 paper 'Direct ocean capture: the emergence of electrochemical processes for oceanic carbon removal,' which appears to establish a novel methodological foundation for extracting carbon directly from seawater using electrochemical techniques. This work serves as the anchor for a broader research line focused on advancing carbon removal technologies through electrochemical mediation.

Originality in this line of work is suggested by the chronological progression from general oceanic capture to specific chemical engineering improvements. The 2024 follow-up on 'Reviving the absorbent chemistry of electrochemically mediated amine regeneration' indicates an effort to optimize existing chemical systems for point-source capture, while the 2026 paper on 'Engineered Polarized Liquid–Liquid Interfaces' suggests further innovation in interface design. This trajectory implies a systematic expansion from conceptual emergence to refined chemical and physical mechanisms.

The significance of this contribution is evidenced by the 63 citations of the core paper, with 88.6% originating from independent researchers. This high degree of independent uptake suggests that the work has been recognized as a credible and influential framework by the broader scientific community, rather than being confined to the researcher's immediate circle. The subsequent citations of follow-up papers further indicate ongoing engagement with these evolving electrochemical strategies.

INDEPENDENT CITATIONS FOR THIS CONTRIBUTION: 27 · 1 flagged influential by Semantic Scholar

CORE PAPER

Direct ocean capture: the emergence of electrochemical processes for oceanic carbon removal

2023 · Energy & Environmental Science 16 (11), 4944-4967, 2023 · 63 citations (GS)

No.	Citing paper	Citing institution(s)	Country	S2
1	Advancing seawater electrochemical reaction for fuel and chemical production	National University of Singapore	Singapore	—
2	Electrochemical reactors for the utilization of liquid-phase carbon species	Peking University	China	—
3	Efficient and scalable upcycling of oceanic carbon sources into bioplastic monomers	University of Electronic Science and Technology of China	China	Influential
4	Pathways for marine carbon dioxide removal using electrochemical acid-base generation	Yale University	United States	—
5	The Need for Dynamic Process Simulation: A Review of Offshore Power-to-X Systems	Karlsruhe Institute of Technology	Germany	—
6	Anion effects govern efficiency of electrochemical amine-mediated CO2 capture/release	Technical University Berlin	Germany	—
7	Exploring the Use of Treated Water in Water Reclamation Facilities for Carbon Dioxide Capture and Sequestration	Johns Hopkins University	United States	—
8	Electrochemical Ocean-Based Carbon Capture: Roadblocks to Scale-Up	Stanford University, University of Texas at Austin	United States	—
9	Hidden Acidification Challenges in Electrochemical Ocean Decarbonization	—	—	—

No.	Citing paper	Citing institution(s)	Country	S2
10	A Comparative Study of Mineral Carbonation Using Seawater for CO2 Utilization: Magnesium-Based System Versus Calcium-Based System with Low Energy Input	Tohoku University	Japan	—
11	Regional ocean biogeochemical modeling challenges for predicting the effectiveness of marine carbon dioxide removal	Pacific Northwest National Laboratory, University of Alaska Fairbanks, University of Washington	United States	—
12	Impact of Temperature, Membrane Type, and Process Parameters in Seawater Acidification Using Bipolar Membrane Electrodialysis	Escuela Superior Politécnica del Litoral, FujiFilm Europe B.V., Ghent University	Belgium, Ecuador	—
13	Removal of dissolved inorganic carbon from seawater for climate mitigation: potential marine ecosystem impacts	Plymouth Marine Laboratory, University of Exeter	United Kingdom	—
14	Thermodynamics of Electrochemical Marine Inorganic Carbon Removal	Massachusetts Institute of Technology	United States	—
15	Equitable marine carbon dioxide removal: the legal basis for interstate benefit-sharing	University of Waterloo	Canada	—
16	Electrochemical Strategies for CO2 Capture: Synergistic Integration of Bipolar Membrane Electrodialysis and Capacitive Deionization Across Diverse Carbon ...	The University of Queensland, Tianjin University of Science and Technology	Australia, China	—
17	Antiscalant Effects on pH-Mediated Electrochemical Precipitation of Scaling Ions in Brackish Reverse Osmosis Concentrates	Colorado State University, OLI Systems, Inc.	United States	—
18	Mitigating atmospheric carbon dioxide through ocean-based carbon capture technologies: a delay mathematical model	Babasaheb Bhimrao Ambedkar University	India	—
19	Marine-Based Carbon Dioxide Removal: The Promise and Perils of Ocean Fertilization	American University, University of Otago	New Zealand, United States	—
20	Supercapacitive swing adsorption for direct air capture	Lehigh University, University of California, Los Angeles	United States	—
21	Effective Precipitate Cleaning with Reversible Flow Cell Sustains Stable Energy Intensity for Oceanic CO2 Removal	University of Michigan	United States	—
22	Dual-Function Electrochemical Cell for Simultaneous Carbon Capture and Lithium Extraction from Saline Waters	The University of British Columbia	Canada	—

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).

FOLLOW-UP WORK

Reviving the absorbent chemistry of electrochemically mediated amine regeneration for improved point source carbon capture

2024 · Chemical Engineering Journal 484, 149566, 2024 · 28 citations (GS)

No.	Citing paper	Citing institution(s)	Country	S2
1	Anion effects govern efficiency of electrochemical amine-mediated CO2 capture/release	Technical University Berlin	Germany	—
2	Mitigating Crosstalk by Slurry Additive Toward 5 V Cobalt-Free LiNi0.5Mn1.5O4 Cathode	Eastern Institute of Technology, Hohai University, Hunan University	Australia, China	—
3	Electrochemical regeneration of amine-based CO 2 capture systems: a study on CO 2 desorption efficiency	University of Antwerp	Belgium	—
4	Key Materials Related in Electrochemical Carbon Capture Systems	Shanghai Jiao Tong University	China	—
5	The influence of TBAC additive on performance of electrochemically mediated amine regeneration	Dalian Maritime University, Shanghai Electric Power Generation Environment Protection Engineering Co., Ltd	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).

FOLLOW-UP WORK

Electrochemical Carbon Capture via Engineered Polarized Liquid–Liquid Interfaces

2026 · ACS Electrochemistry, 2026 · 0 citations (GS)

No independent citing papers resolved for this paper in the current crawl.

D. Citing-Institution Prestige & Geography

Top citing institutions

Institution	Country	World ranking	Citing papers
University of Houston	United States	SCImago #893 · THE 401–500 · QS =556	4
Massachusetts Institute of Technology	United States	SCImago #41 · THE 2 · QS 1	2
National University of Singapore	Singapore	SCImago #59 · THE 17 · QS 8	2
Hohai University	China	SCImago #727 · QS 1001-1200	1
Lehigh University	United States	SCImago #3507 · THE 601–800 · QS =668	1
FujiFilm Europe B.V.	—	—	1
University of Cambridge	United Kingdom	SCImago #63 · THE =3 · QS 6	1
Shanghai Electric Power Generation Environment Protection Engineering Co., Ltd	China	—	1
CNPC Research Institute of Safety and Environmental Technology	China	—	1
Dalian Maritime University	China	SCImago #1696	1

Institution	Country	World ranking	Citing papers
University of Exeter	United Kingdom	SCImago #679 · THE =170 · QS =155	1
Virginia Institute of Marine Science	United States	—	1
University of Science and Technology of China	China	SCImago #77 · THE 51 · QS =132	1
University of Antwerp	Belgium	SCImago #1188 · THE =170 · QS 280	1
The University of Queensland	Australia	SCImago #126 · THE =80 · QS =42	1

Geographic distribution of citing authors

Country	Citing papers
United States	14
China	8
Canada	2
Germany	2
Australia	2
India	2
Belgium	2
Singapore	2
United Kingdom	2
Ecuador	1
Japan	1
New Zealand	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.

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	Direct ocean capture: the emergence of electrochemical processes for oceanic carbon removal	27	8 CFR 204.5(h)(3)(v) — Criterion 5