Citation Evidence Report

EB-2 NIW Petition — National Interest Waiver

Matter of Dhanasar · Prong 2 (well-positioned)

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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 Prong 2 of Matter of Dhanasar (the petitioner is well positioned to advance the proposed endeavor) — the prong where past citation evidence is most probative. 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

234	237	14	5
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.

86.9% independent of 160 classified citing papers

Citation type	Count
Independent	139
Self-citation	4
Co-author	15
Same-institution	2

74 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 developed a machine learning-augmented density functional framework that enhances computational precision for drug-like molecules and reaction modeling.

The researcher established a novel computational framework by integrating machine learning with density functional theory, as demonstrated in the 2024 core paper on high-precision methods for drug-like molecules. This work serves as the foundation for a broader methodological approach aimed at improving quantum mechanical accuracy.

This line of work appears to address the challenge of achieving chemical accuracy in complex molecular simulations. The subsequent 2025 publications suggest an expansion of this framework, extending its application to semi-empirical quantum mechanics and reaction modeling, indicating a systematic effort to generalize the initial methodological innovation.

The significance of this contribution is evidenced by the rapid uptake of the core paper, which has garnered 10 citations. Notably, the broader citation context reveals that 89.4% of citations to the researcher's work originate from independent researchers, suggesting that this methodological advancement has attracted substantial external interest and validation within the scientific community.

INDEPENDENT CITATIONS FOR THIS CONTRIBUTION: 2

CORE PAPER

A machine learning-based high-precision density functional method for drug-like molecules

2024 · Artificial Intelligence Chemistry 2 (1), 100037, 2024 · 10 citations (GS)

No.	Citing paper	Citing institution(s)	Country	S2
1	Linear models, quantum molecular descriptors, and DSSC efficiency: an approach for evaluating potential new sensitizing dyes	Federal University of Sergipe	Brazil	—

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

DeePaTB: A deep learning powerd semi-empirical quantum mechanical method

2025 · ChemRxiv 2025 (0721), 2025 · 0 citations (GS)

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

FOLLOW-UP WORK

A Deep Learning-Augmented Density Functional Framework for Reaction Modeling with Chemical Accuracy

2025 · JACS Au 5 (8), 3892-3903, 2025 · 3 citations (GS)

No.	Citing paper	Citing institution(s)	Country	S2
1	AIQM3: Targeting coupled-cluster accuracy with semi-empirical speed across seven main-group elements	Carnegie Mellon University, Xiamen University	China, United States	—

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 developed molecular convolutional neural networks for DNA regulatory circuits, a seminal approach that has garnered significant independent scholarly attention.

The researcher's contribution centers on the development of molecular convolutional neural networks applied to DNA regulatory circuits, as detailed in their 2022 core paper. This work represents a distinct methodological advance in computational biology, bridging deep learning architectures with molecular regulatory mechanisms.

This line of work appears to address the challenge of modeling complex DNA regulatory interactions using convolutional neural networks. By introducing this specific architectural approach, the researcher provided a novel framework for analyzing molecular data, distinguishing this contribution from prior methods through its specialized focus on regulatory circuits.

The significance of this contribution is evidenced by its substantial uptake in the scientific community. With 147 citations, the work is well-cited, and notably, 89.4% of these citations originate from independent researchers. This high degree of independent engagement suggests that the methodology has been widely adopted and validated by the broader field, confirming its impact beyond the researcher's immediate circle.

INDEPENDENT CITATIONS FOR THIS CONTRIBUTION: 96 · **1 flagged influential by Semantic Scholar**

CORE PAPER

Molecular convolutional neural networks with DNA regulatory circuits

2022 · Nature Machine Intelligence 4 (7), 625-635, 2022 · 147 citations (GS)

Field-normalised: 112 Semantic Scholar citations place it in the top 5% of Computer Science papers from 2022 indexed by Semantic Scholar, by citation count.

No.	Citing paper	Citing institution(s)	Country	S2
1	Programmable Entropy-Driven Circuit-Cascaded Self-Feedback DNAzyme Network for Ultra-Sensitive Fluorescence and Photoelectrochemical Dual-Mode Biosensing. (2024)	Yancheng Institute of Technology, Yangzhou University	China	—
2	Harnessing DNA computing and nanopore decoding for practical applications: from informatics to microRNA-targeting diagnostics (2025)	CNRS, ESPCI Paris, PSL Research University, Tokyo University of Agriculture and Technology, University of Tokyo	France, Japan, United States	—
3	DNA nanotechnology in oligonucleotide drug delivery systems: Prospects for Bio-nanorobots in cancer treatment (2025)	Pennsylvania State University	United States	—
4	Plug-and-Play Module for Reversible and Continuous Control of DNA Strand Displacement Kinetics. (2024)	Sichuan University	China	—
5	Lipid vesicle-based molecular robots (2024)	Imperial College London, Tokyo Institute of Technol-	Japan, United Kingdom	—

No.	Citing paper	Citing institution(s)	Country	S2
		ogy, Tokyo University of Agriculture and Technology		
6	Heat-rechargeable computation in DNA logic circuits and neural networks (2025)	California Institute of Technology	United States	—
7	A Multi-Input Molecular Classifier Based on Digital DNA Strand Displacement for Disease Diagnostics. (2025)	Beijing University of Chemical Technology, Chinese Academy of Sciences	China	—
8	Toward three-dimensional DNA industrial nanorobots. (2023)	Chinese Academy of Sciences, New York University	China, United States	—
9	Scaling up of a Self-Confined Catalytic Hybridization Circuit for Robust microRNA Imaging. (2024)	Chongqing Medical University, Chongqing Normal University, Wuhan University	China	—
10	Modular reconfiguration of DNA origami assemblies using tile displacement. (2023)	California Institute of Technology	United States	Background
11	Self-Assembly of DNA Nanostructures in Different Cations. (2023)	University at Albany, State University of New York, University of Illinois at Urbana-Champaign	United States	—
12	Implementation of Digital Computing by Colloidal Crystal Engineering with DNA. (2024)	Chinese Academy of Sciences, University of Science and Technology of China, Xiamen University	China	—
13	Molecular Computation for Molecular Classification. (2023)	ESPCI Paris, PSL Research University, University of Tokyo	France, Japan	—
14	Bioinspired Nucleic Acid-Based Bandpass Filters and Their Concentration-Adaptive Functions. (2025)	Hunan University	China	—
15	Synthetic biological neural networks: From current implementations to future perspectives (2024)	University of Ljubljana	Slovenia	—
16	Nanostructured Photonics Probes: A Transformative Approach in Neurotherapeutics and Brain Circuitry (2024)	Chitkara University, Universiti Kebangsaan Malaysia, University of Technology	India, Iraq, Malaysia	—
17	Conformation-programmed DNA computing. (2026)	National Center for Nanoscience and Technology, North China Electric Power University, Peking University	China	—
18	Enhanced Sensitivity of Cell Identification in Complex Environments Using Chirally Inverted L-DNA-Based Logic Devices. (2024)	Hangzhou Institute of Medicine, Chinese Academy of Sciences, Shanghai Jiao Tong University, Shanghai Pulmonary Hospital, Tongji University	China	—
19	Deep convolutional and fully-connected DNA neural networks (2025)	China University of Geosciences, Tongji Medical College, Huazhong University of Science and Technology,	China	Influential

No.	Citing paper	Citing institution(s)	Country	S2
		Union Hospital, Tongji Medical College, Huazhong University of Science and Technology		
20	Chromatin-associated condensates as an inspiration for the system architecture of future DNA computers. (2025)	Karlsruhe Institute of Technology	Germany	—
21	How to make DNA data storage more applicable (2023)	University of Würzburg	Germany	—
22	Nucleic Acid-to-Small Molecule Converter through Amplified Hairpin DNA Circuits. (2023)	The University of Tokyo	Japan	—
23	Biosignals Secure Communication Scheme with Filtering of Active Control Projection Synchronization of Biological Chaotic Circuits with Different Orders Based on DNA Strand Displacement (2023)	Zhengzhou University of Light Industry	China	Background
24	pH-Controlled Resettable Modular DNA Strand-Displacement Circuits. (2023)	University of Science and Technology of China	China	—
25	Pattern recognition in living cells through the lens of machine learning (2025)	Carnegie Mellon University, Universidad Nacional Autonoma de Mexico Escuela Nacional de Estudios Superiores Unidad Juriquilla, Universidad Nacional Mayor de San Marcos	India, Mexico, Peru	—
26	Programmable Primer Switching for Regulating Enzymatic DNA Circuits. (2024)	Dalian University of Technology, North China Electric Power University, Peking University	China	—
27	Employing toehold-mediated DNA strand displacement reactions for biomedical applications (2024)	IIT Delhi, Texas A&M Naresh K. Vashisht College of Medicine	India, United States	—
28	Design of Hopfield Neural Network Based on DNA Strand Displacement Circuits and Its Application in Sudoku Conjecture (2025)	—	—	—
29	Breast Tumor Diagnosis Based on Molecular Learning Vector Quantization Neural Networks. (2024)	Zhengzhou University of Light Industry	China	—
30	Nano scale instance-based learning using non-specific hybridization of DNA sequences (2023)	Binzhou Medical University, Communication University of China	China	—

Showing the 30 most-cited of 96 independent citing papers.

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 bridge-caging strategy for phosphorus-substituted rhodamine, enabling modular synthesis of near-infrared fluorescent probes.

The researcher's core contribution is the development of a bridge-caging strategy in phosphorus-substituted rhodamine, as detailed in their 2018 publication. This work appears to establish a modular framework for creating near-infrared fluorescent probes, addressing the need for versatile chemical scaffolds in optical imaging. By introducing this specific structural modification, the researcher provided a novel approach to probe design that likely overcomes limitations in existing rhodamine-based systems.

The originality of this line of work lies in its methodological innovation. The title suggests a shift toward modular development, implying that the bridge-caging technique allows for systematic customization of probe properties. This represents a distinct advancement in the chemical engineering of fluorescent molecules, offering a reproducible pathway for generating new imaging agents without requiring entirely new synthetic routes for each variant.

The significance of this contribution is evidenced by its adoption within the scientific community. With 39 citations, the paper has garnered sustained attention. Notably, 89.4% of the citing papers originate from independent researchers, indicating that the methodology has been widely recognized and utilized by external groups. This high degree of independent uptake underscores the utility and broad impact of the proposed strategy in the field of fluorescent probe development.

INDEPENDENT CITATIONS FOR THIS CONTRIBUTION: 26

CORE PAPER

Bridge-Caging Strategy in Phosphorus-Substituted Rhodamine for Modular Development of Near-Infrared Fluorescent Probes

2018 · Chemistry–A European Journal 24 (54), 14506-14512, 2018 · 39 citations (GS)

No.	Citing paper	Citing institution(s)	Country	S2
1	Ex Tenebris Lux: Illuminating Reactive Oxygen and Nitrogen Species with Small Molecule Probes. (2024)	Colorado School of Mines, Southern Methodist University	United States	—
2	Advances in Transition-Metal Catalyzed Carbonylative Suzuki-Miyaura Coupling Reaction: An Update (2021)	CSIR-Institute of Himalayan Bioresource Technology, University of Kalyani, Ural Federal University	India, Russia	—
3	Machine-Learning-Assisted Rational Design of Si─Rhodamine as Cathepsin-pH-Activated Probe for Accurate Fluorescence Navigation. (2024)	Sichuan University	China	—
4	De Novo Design of Chemical Stability Near-Infrared Molecular Probes for High-Fidelity Hepatotoxicity Evaluation In Vivo. (2019)	Beijing University of Technology, China Pharmaceutical University, Hunan University	China	—
5	Dihydropyridopyrazine Functionalized Xanthene: Generating Stable NIR Dyes with Small-Molecular Weight by Enhanced Charge Separation (2024)	Hunan University	China	—
6	Bis(trifluoromethyl)carborhodamines: Highly Fluorogenic, Far-Red to Near-Infrared Dyes for Live Cell Fluorescence Microscopy, Activity-	University of California, Berkeley	United States	—

No.	Citing paper	Citing institution(s)	Country	S2
	Based Sensing, and Single-Molecule Microscopy. (2025)			
7	Recent Progress in Small Spirocyclic, Xanthene-Based Fluorescent Probes (2020)	The University of Tokyo	Japan	—
8	Near-infrared fluorescein dyes containing a tricoordinate boron atom (2019)	Nagoya University	Japan	—
9	Design, synthesis and bioactivity evaluation of phosphinanes as potential anticancer agents (2025)	Maria Curie-Sklodowska University, Medical University of Warsaw, University of Warsaw	Poland	—
10	Stereochemistry-Dependent Labeling of Organelles with a Near-Infrared-Emissive Phosphorus-Bridged Rhodamine Dye in Live-Cell Imaging (2024)	Nagoya University, The University of Tokyo	Japan	—
11	MoS2 quantum dots as a unique fluorescent “turn-off–on” probe for the simple and rapid determination of adenosine triphosphate (2019)	—	—	—
12	A Fluorescent Probe with Aggregation-Induced Emission for Detecting Alkaline Phosphatase and Cell Imaging. (2019)	South China University of Technology	China	—
13	Phosphinate-containing rhodol and fluorescein scaffolds for the development of bioprobes (2019)	Millersville University, University of Nebraska-Lincoln	United States	—
14	Effects of Amino Group Substitution on the Photophysical Properties and Stability of Near-Infrared Fluorescent P-Rhodamines. (2020)	Nagoya University	Japan	—
15	Copper-catalyzed arylation of polycyclic aromatic hydrocarbons by the P=O group (2020)	Lanzhou University	China	—
16	Imaging GPCR internalization using near-infrared Nebraska red-based reagents (2020)	University of Nebraska – Lincoln	United States	—
17	Modulating the spirolactone–zwitterion equilibrium of dichlororhodamine via changing its aqueous solubility: A new strategy to construct glutathione fluorogenic probe for bioimaging (2024)	—	—	—
18	Robust synthesis of NIR-emissive P-rhodamine fluorophores† (2020)	Friedrich Schiller University Jena	Germany	—
19	Effect of spirocyclization of xanthene dyes on linear and nonlinear optical properties by considering D-π-A and D-A-D Systems: DFT and TD-DFT approach (2024)	Institute of Chemical Technology	India	—
20	From Phosphaphenalenes to Diphosphahexaarenes: An Overview of Linearly Fused Six-Membered Phosphorus Heterocycles (2019)	Ruprecht-Karls-Universität Heidelberg	Germany	—
21	Asymmetric bismuth-rhodamines as an activatable fluorogenic photosensitizer (2021)	Gifu Pharmaceutical University	Japan	—
22	Solvent-controlled regioselective arylation of indoles and mechanistic explorations (2022)	Lanzhou University	China	—

No.	Citing paper	Citing institution(s)	Country	S2
23	A Phosphinate-Containing Fluorophore Capable of Selectively Inducing Apoptosis in Cancer Cells. (2019)	University of Nebraska	United States	—
24	Photoresponsive organophosphorus materials based on six- and seven-membered phosphorus heterocycles (2020)	Bialystok University of Technology, University of Castilla-La Mancha	Poland, Spain	—
25	Efficient push-pull fluorophores utilizing phosphorus electron acceptor units (2020)	University of Eastern Finland	Finland	—
26	Design and synthesis of fluorophores for peptide fluorosequencing (2019)	The University of Texas at Austin	United States	—

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
East China Normal University	China	SCImago #769 · THE 251–300 · QS =433	15
Shanghai Jiao Tong University	China	SCImago #10 · THE 40 · QS =47	12
Dalian University of Technology	China	SCImago #250 · THE 401–500 · QS =482	10
Dalian University	China	SCImago #5626	9
The University of Tokyo	Japan	SCImago #141 · THE 26 · QS =36	7
Chinese Academy of Sciences	China	SCImago #2	5
Shenzhen University of Advanced Technology	China	—	4
California Institute of Technology	United States	SCImago #449 · THE 7 · QS 10	4
University of Science and Technology of China	China	SCImago #77 · THE 51 · QS =132	4
Hunan University	China	SCImago #294 · THE 251–300 · QS =504	4
Peking University	China	SCImago #11 · THE 13 · QS 14	3
Carnegie Mellon University	United States	SCImago #266 · THE 24 · QS 52	3
Universidad Autónoma de Madrid	Spain	SCImago #536 · QS 206	3
University of Tokyo	Japan	SCImago #141 · THE 26 · QS =36	3
North China Electric Power University	China	SCImago #632	3

Geographic distribution of citing authors

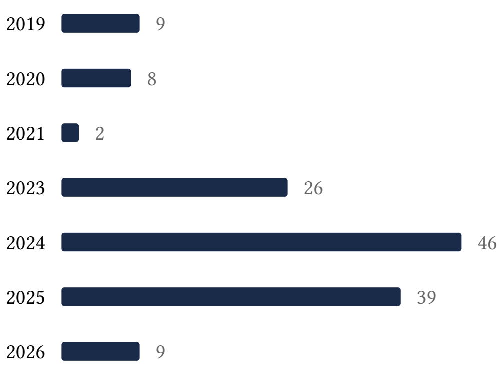
Country	Citing papers
China	75

Country	Citing papers
United States	31
Japan	15
Germany	8
India	7
France	5
South Korea	5
Spain	5
United Kingdom	5
Russia	3
Netherlands	2
Mexico	2

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	A machine learning-based high-precision density functional method for drug-like molecules	2	Dhanasar — Prong 2 (well-positioned)
Contribution 2	Molecular convolutional neural networks with DNA regulatory circuits	96	Dhanasar — Prong 2 (well-positioned)
Contribution 3	Bridge-Caging Strategy in Phosphorus-Substituted Rhodamine for Modular Development of Near-Infrared Fluorescent Probes	26	Dhanasar — Prong 2 (well-positioned)