

Citation Evidence Report

EB-2 NIW Petition — National Interest Waiver

Matter of Dhanasar · Prong 2 (well-positioned)

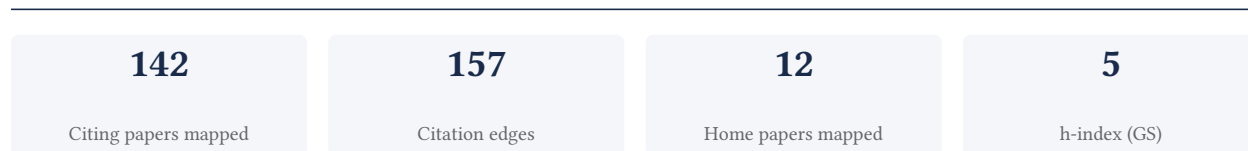
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[Google Scholar profile](#)

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



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.

94.4% independent of 142 classified citing papers

Citation type	Count
Independent	134
Self-citation	4
Co-author	4
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 developed a canonical ensemble auxiliary field quantum Monte Carlo method, enabling precise finite-temperature simulations of interacting fermion systems and establishing a stable recursive algorithm for broader applications.

The researcher established a foundational method for finite-temperature auxiliary field quantum Monte Carlo simulations within the canonical ensemble, as detailed in their 2020 core paper. This work serves as the technical basis for subsequent advancements in simulating complex fermionic systems.

This line of work appears to address the computational challenges of modeling interacting fermions by introducing a canonical ensemble framework. The titles of follow-up papers from 2023 and 2024 suggest the researcher extended this foundation to create stable recursive algorithms and apply the method to disentangle physics in the attractive Hubbard model using symmetry-resolved entanglement entropies.

The significance of this contribution is evidenced by the core paper's 37 citations, with 97.2% originating from independent researchers. This high rate of independent uptake indicates that the method has been widely adopted by the broader scientific community for studying thermometry and interacting models.

INDEPENDENT CITATIONS FOR THIS CONTRIBUTION: 48

CORE PAPER

[Finite temperature auxiliary field quantum Monte Carlo in the canonical ensemble](#)

2020 · The Journal of Chemical Physics 153 (20), 2020 · 37 citations (GS)

No.	Citing paper	Citing institution(s)	Country	S2
1	Taylor series perspective on ab initio path integral Monte Carlo simulations with Fermi-Dirac statistics (2026)	Center for Advanced Systems Understanding, Helmholtz-Zentrum Dresden-Rossendorf, Royal Institute of Technology (KTH)	Germany, Sweden	—
2	Piecewise interaction picture density matrix quantum Monte Carlo (2022)	University of Iowa	United States	—
3	Electronic specific heat capacities and entropies from density matrix quantum Monte Carlo using Gaussian process regression to find gradients of noisy data (2023)	University of Iowa	United States	—
4	Toward first principles-based simulations of dense hydrogen	Center for Advanced Systems Understanding (CASUS), Christian-Albrechts-Universität zu Kiel, Ecole Polytechnique	France, Germany, United Kingdom	—
5	First principles simulations of dense hydrogen	Centre National de la Recherche Scientifique, École Polytechnique, Commissariat à l'Énergie Atomique et aux Énergies Alternatives, Sorbonne Université, Laboratoire pour l'Utilisation des Lasers Intenses, Centre National de la Recherche Scien-	France, Germany, Italy	—

No.	Citing paper	Citing institution(s)	Country	S2
		tifique, Université Grenoble Alpes, Christian-Albrechts-Universität zu Kiel		
6	The ALF (Algorithms for Lattice Fermions) project release 2.4. Documentation for the auxiliary-field quantum Monte Carlo code	Perimeter Institute for Theoretical Physics, Universität Würzburg, University of Würzburg	Canada, Germany, Israel	—
7	Real-time quantum dynamics of thermal states with neural thermofields	École Polytechnique Fédérale de Lausanne, EPFL	Switzerland	—
8	Gaussian-based periodic grand canonical density functional theory with implicit solvation for computational electrochemistry	Harvard University	United States	—
9	A phaseless auxiliary-field quantum Monte Carlo perspective on the uniform electron gas at finite temperatures: Issues, observations, and benchmark study	Columbia University, Lawrence Livermore National Laboratory	United States	—
10	On the potentially transformative role of auxiliary-field quantum Monte Carlo in quantum chemistry: A highly accurate method for transition metals and beyond	Center for Theoretical Biological Physics, Columbia University, Flatiron Health (United States)	United States	—
11	Taylor series perspective on ab initio path integral Monte Carlo simulations with Fermi-Dirac statistics	Center for Advanced Systems Understanding, Helmholtz-Zentrum Dresden-Rossendorf, Royal Institute of Technology (KTH)	Germany, Sweden	—
12	Improved modularity and new features in ipie: Toward even larger AFQMC calculations on CPUs and GPUs at zero and finite temperatures	Columbia University, Google Research, Harvard University	France, United States	—
13	Quadratic scaling bosonic path integral molecular dynamics	Tel Aviv University	Israel	—
14	Excitations of quantum many-body systems via purified ensembles: A unitary-coupled-cluster-based approach	CNR, INO-CNR, Max Planck Institute for the Physics of Complex Systems	Germany, Italy	—
15	Toward an accurate equation of state and B1-B2 phase boundary for magnesium oxide up to terapascal pressures and electron-volt temperatures	Lawrence Livermore National Laboratory, University of Rochester	United States	Background
16	Casimir and Helmholtz forces in one-dimensional Ising model with Dirichlet (free) boundary conditions	Bulgarian Academy of Sciences, University of California, Los Angeles	Bulgaria, United States	—
17	Reweighting Scheme for the Calculation of Grand-Canonical Expectation Values in Quantum Monte Carlo Simulations With a Fermion Sign Problem	Helmholtz-Zentrum Dresden-Rossendorf, Universität Rostock	Germany	—
18	Multi-body wave function of ground and low-lying excited states using unornamented deep neural networks	Kyoto University, Nagoya University, RIKEN	Japan	Methodology

No.	Citing paper	Citing institution(s)	Country	S2
19	Mechanisms of Temperature Control of Singlet Fission in an Optical Cavity	Hangzhou Dianzi University, Nanyang Technological University	China, Singapore	—
20	Analyzing X-ray Thomson scattering experiments of warm dense matter in the imaginary-time domain: Theoretical models and simulations	Center for Advanced Systems Understanding, Helmholtz-Zentrum Dresden-Rossendorf	Germany	Background
21	Frontiers of stochastic electronic structure calculations	Lawrence Livermore National Laboratory, Quantum Simulations (United States), Sandia National Laboratories, University of Illinois Urbana-Champaign	United States	—
22	Fermionic neural Gibbs states	ETH Zürich	Switzerland	—
23	Exact kinetic propagators for coherent state complex Langevin simulations	University of California, Santa Barbara	United States	—
24	Removing Basis Set Incompleteness Error in Finite-Temperature Electronic Structure Calculations: Two-Electron Systems	Michigan State University	United States	—
25	Thermal coupled cluster theory for SU (2) systems	Rice University	United States	—
26	Phase diagram of the antiferromagnet of spin on a square lattice	Klinik und Poliklinik für Psychosomatik und Psychotherapie	Germany	Methodology
27	Precision thermodynamics of the strongly interacting Fermi gas in two dimensions	University of Louisville, Yale University	United States	—
28	Electronic Free Energy Surface of the Nitrogen Dimer Using First-Principles Finite Temperature Electronic Structure Methods	University of Iowa	United States	—
29	The sign problem in density matrix quantum Monte Carlo	University of Iowa	United States	—
30	Fermionic-propagator and alternating-basis quantum Monte Carlo methods for correlated electrons on a lattice	University of Belgrade	Serbia	—

Showing the 30 most-cited of 35 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 is Influential signal, Valenzuela et al. 2015), or *Background* (a passing mention).

Citing-text excerpts — how the field used this work

METHODOLOGY Multi-body wave function of ground and low-lying excited states using unornamented deep neural networks

“...Monte Carlo method (QMC) including the variational Monte Carlo, diffusion Monte Carlo (DMC), and auxiliary-field quantum Monte Carlo methods [13–19], the configuration interaction method [20–22], the coupled cluster method [23–26], the density functional theory (DFT) [27–29], the density...”

METHODOLOGY Phase diagram of the antiferromagnet of spin on a square lattice

“Notice that, unlike available techniques for canonical QMC simulations [35, 36], where the global charge of the system is fixed, here we need to impose half-filling on each lattice site.”

FOLLOW-UP WORK

[Disentangling the physics of the attractive Hubbard model as a fully interacting model of fermions via the accessible and symmetry-resolved entanglement entropies](#)

2024 · Physical Review B 109 (19), 195119, 2024 · 3 citations (GS)

No.	Citing paper	Citing institution(s)	Country	S2
1	Revisiting the symmetry-resolved entanglement for noninvertible symmetries in conformal field theories	The University of Melbourne	Australia	Background
2	Local classical correlations between physical electrons in the Hubbard model	Centre National de la Recherche Scientifique, Commissariat à l'Énergie Atomique et aux Énergies Alternatives, Université Paris-Saclay, CEA Paris-Saclay, Centre National de la Recherche Scientifique, École Polytechnique, Commissariat à l'Énergie Atomique et aux Énergies Alternatives, Université Paris-Saclay, Institut Rayonnement-Matière de Saclay, CEA Paris-Saclay, Centre National de la Recherche Scientifique, Laboratoire de Cristallographie, Résonance Magnétique et Modélisations, Université de Lorraine	Canada, France, Germany	—
3	Local classical correlations between physical electrons in Hubbard systems	Consiglio Nazionale delle Ricerche, SISSA, Scuola Internazionale Superiore di Studi Avanzati	Italy	—

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

[Stable recursive auxiliary field quantum Monte Carlo algorithm in the canonical ensemble: Applications to thermometry and the Hubbard model](#)

2023 · Physical Review E 107 (5), 055302, 2023 · 12 citations (GS)

No.	Citing paper	Citing institution(s)	Country	S2
1	Quadratic scaling bosonic path integral molecular dynamics	Tel Aviv University	Israel	—
2	Exact kinetic propagators for coherent state complex Langevin simulations	University of California, Santa Barbara	United States	—
3	Electronic Free Energy Surface of the Nitrogen Dimer Using First-Principles Finite Temperature Electronic Structure Methods	University of Iowa	United States	—

No.	Citing paper	Citing institution(s)	Country	S2
4	Fermionic-propagator and alternating-basis quantum Monte Carlo methods for correlated electrons on a lattice	University of Belgrade	Serbia	—
5	Quantum sensing with ultracold simulators in lattice and ensemble systems: A review	Harish-Chandra Research Institute	India	—
6	Projected complex Langevin sampling method for bosons in the canonical and microcanonical ensembles	University of California, Santa Barbara	United States	—
7	Thermodynamics of the Fermi-Hubbard Model through Stochastic Calculus and Girsanov Transformation	Hochschule RheinMain	Germany	—
8	Pseudogap regime of the unitary Fermi gas with lattice auxiliary-field quantum Monte Carlo in the continuum limit	Quantinuum, Yale University	United States	—
9	Field-Theoretic Methods for Bosonic Systems	Institute of Applied Physics	Russia	—
10	Fermionic-propagator and alternating-basis quantum Monte Carlo methods for correlated electrons on a lattice	University of Belgrade	Serbia	—

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 advanced TiO₂ photocatalysis by investigating bulk/surface defect ratios and Fe-doping strategies, establishing a foundational framework for optimizing nanosheet and hierarchical structures.

The researcher's contribution centers on optimizing titanium dioxide photocatalysts through defect engineering and structural modification. This line of work is anchored by a 2017 core paper examining the effect of bulk/surface defects ratios on TiO₂ nanosheet films, which has accumulated 54 citations. The titles indicate a focus on manipulating material properties to enhance photocatalytic efficiency.

Originality in this work appears to lie in the systematic exploration of defect ratios and subsequent doping strategies. Following the core study, the researcher published a 2018 paper on Fe-doped hierarchical TiO₂ ball-flowers, suggesting an evolution from fundamental defect analysis to applied structural enhancements. This progression implies a novel approach to tailoring TiO₂ morphology and composition for improved water-splitting performance.

The significance of this research is evidenced by strong independent uptake. The core paper's 54 citations and the follow-up's 29 citations demonstrate sustained interest. Notably, 97.2% of the 142 classified citations originate from independent researchers, indicating that the broader scientific community has adopted these findings to advance their own work in photocatalysis and materials science.

INDEPENDENT CITATIONS FOR THIS CONTRIBUTION: 80

CORE PAPER

[The effect of bulk/surface defects ratio change on the photocatalysis of TiO₂ nanosheet film](#)

2017 · Applied Surface Science 410, 513-518, 2017 · 54 citations (GS)

No.	Citing paper	Citing institution(s)	Country	S2
1	Hierarchically macro-meso-microporous metal-organic framework for photocatalytic oxidation (2020)	—	—	—
2	Improved dark ambient degradation of organic pollutants by cerium strontium cobalt perovskite (2020)	Queensland University of Technology, Universidade Nova de Lisboa, Rede de Química e Tecnologia, University of Science and Technology of China, Hefei National Center for Physical Sciences at Nanoscale	Australia, China, Portugal	—
3	Synergetic effects of the interfacial dyadic structure on the interfacial charge transfer between surface-complex and TiO₂ (2019)	Fujian Agriculture and Forestry University, Fujian Agriculture and Forestry University, Fuzhou University, Fujian Electric Power Survey & Design Institute	China	—
4	Charge carrier transfer in photocatalysis (2020)	Institute of Materials Research and Engineering, Agency for Science, Technology and Research, Leibniz University Hannover, St Petersburg University, North China Electric Power University	China, Germany, Singapore	—
5	Design and application of various visible light responsive metal oxide photocatalysts (2020)	—	—	—
6	Comparisons of magnetic defects and coercive forces for Co/Si (100) and Co/rubrene/Si (100) (2020)	—	—	—
7	Enhanced photocatalytic degradation of N-doped TiO₂-SiO₂ composite for degradation of phenol under simulated natural light assisted by S₂O₈²⁻ ... (2021)	Ho Chi Minh City University of Technology, Vietnam National University Ho Chi Minh City	Vietnam	—
8	Optimum anatase/rutile ratios of TiO₂ for photocatalytic denitrification from IX brine waste and real RO concentrate: RSM-CCD model and the use of an economical ... (2023)	Ilam University of Medical Sciences, University of Tehran	Iran	—
9	XXXXXXXXXXXXXXXXXXXXXXXXXXXX (2019)	—	—	—
10	TiO₂ XXXX Ag XXXXXXXXXXXXXXXXXXXXXXX (2018)	—	—	—
11	XXXXXXXXXXXXXXXXXXXXXXXXXXXX B (2020)	XXXXXX	XX	—
12	Carbon material selection and performance enhancement mechanism for constructing highly active Ag₃PO₄-based hybrid photocatalysts modified with diverse ... (2024)	Sichuan University, Western Metal Materials (China)	China	—
13	Ultra-fast green synthesis of a defective TiO₂ photocatalyst towards hydrogen production	—	—	—
14	Highly photocatalytic activity of nanocrystalline TiO₂ (anatase, rutile) powders prepared from TiCl₄ by sol-gel method in aqueous solutions.	Université Claude Bernard Lyon 1, Centre National de la Recherche Scientifique, Institut	France, Saudi Arabia	—

No.	Citing paper	Citing institution(s)	Country	S2
		de Recherches sur la Catalyse et l'Environnement de Lyon, University of Gabès, Université Claude Bernard Lyon 1, Institut de Recherches sur la Catalyse et l'Environnement de Lyon, Centre National de la Recherche Scientifique, Université Claude Bernard Lyon 1, University of Gabès, Centre National de la Recherche Scientifique, Automation and Process Engineering Laboratory		
15	TiO2 coated complex 3D Foams: Physical properties and photocurrent generation mechanisms	Centre National de la Recherche Scientifique, Institut Jean Lamour, Université de Lorraine, University of Namur, University of Namur, Advanced Coatings (Belgium)	Belgium, France	—
16	EPR evidence of carrier effect on unpaired-electron number of Mn in SCR: The good, the bad, the ugly	Shanghai Academy of Environmental Sciences, Shanghai University	China	—
17	Ilmenite-type MgTiO3 ceramics by complex (Mn1/2W1/2) 4+ cation co-substitution producing improved microwave characteristics	—	—	—
18	Design of plasmonic Ag-TiO2/H3PW12O40 composite film with enhanced sunlight photocatalytic activity towards o-chlorophenol degradation	—	—	—
19	Combined spectroscopic methods of determination of density of electronic states: comparative analysis of diffuse reflectance spectroelectrochemistry and reversed ...	Hokkaido University, Jagiellonian University	Japan, Poland	—
20	Improving the humidity sensing below 30% RH of TiO2 with GO modification	—	—	—
21	Plasma dynamic synthesis of highly defective fine titanium dioxide with tunable phase composition	—	—	—
22	Engineering the defect distribution in ZnO nanorods through laser irradiation	—	—	—
23	Preparation of nitrogen-doped aluminium titanate (Al2TiO5) nanostructures: application to removal of organic pollutants from aqueous media	—	—	—
24	A facile "dark"-deposition approach for Pt single-atom trapping on faceted anatase TiO2 nanoflakes and use in photocatalytic H2 generation	Friedrich-Alexander-Universität Erlangen-Nürnberg, Friedrich-Alexander-Universität Erlangen-Nürnberg, King Abdulaziz	Czech Republic, Germany	—

No.	Citing paper	Citing institution(s)	Country	S2
		University, Regional Centre of Advanced Technologies and Materials, Friedrich-Alexander-Universität Erlangen-Nürnberg, Tohoku University		
25	Photocatalytic application of defective WO3 nanoparticles for precious metal recovery from plating effluent	Chulalongkorn University, Mahidol University, The Royal College Of Anesthesiologists Of Thailand, Office of the Royal Society, Mahidol University	Thailand	—
26	Interfacial Charge Transfer in Defect-Rich Ti3C2/BiOIO3 Heterostructured Photocatalysts for the Degradation of Methyl Orange	Anhui Jianzhu University	China	—
27	A 2D ZnSe/BiOX vertical heterostructure as a promising photocatalyst for water splitting: A first-principles study	—	—	—
28	Effect of phase composition on the photocatalytic activity of titanium dioxide obtained from supercritical antisolvent	—	—	—
29	Facile synthesis of nitrogen doped ordered mesoporous TiO2 with improved humidity sensing properties	Yangzhou University	China	—
30	Electronic and optical properties of GaN/MoSe2 and its vacancy heterojunctions studied by first-principles	Yili Normal University	China	—

Showing the 30 most-cited of 51 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).

FOLLOW-UP WORK

[Enhanced photocatalytic water-splitting performance using Fe-doped hierarchical TiO2 ball-flowers](#)

2018 · Nanotechnology 29 (3), 035702, 2018 · 29 citations (GS)

No.	Citing paper	Citing institution(s)	Country	S2
1	A critical review in strategies to improve photocatalytic water splitting towards hydrogen production	University of Technology Malaysia	Malaysia	—
2	Nanostructured semiconductor supported iron catalysts for heterogeneous photo-Fenton oxidation: a review	Soochow University	China	—
3	Enhanced photocatalytic hydrogen production and degradation of organic pollutants from Fe (III) doped TiO2 nanoparticles	Carl von Ossietzky Universität Oldenburg	Germany	—
4	Surface and interface engineering of hierarchical photocatalysts	Nankai University, South China Agricultural University, Univer-	China	—

No.	Citing paper	Citing institution(s)	Country	S2
		sity of Electronic Science and Technology of China		
5	Iron-based photocatalytic and photoelectrocatalytic nano-structures: Facts, perspectives, and expectations	—	—	—
6	Synthesis of NiSe₂@ M (M= Cu, Fe and Zn)-NiCo LDH with porous structure on nickel foam for overall fresh and seawater splitting	North University of China	China	—
7	Low temperature synthesis of BiFeO₃ nanoparticles with enhanced magnetization and promising photocatalytic performance in dye degradation and hydrogen ...	Bangladesh University of Engineering and Technology	Bangladesh	—
8	Progress in scalable photocatalytic hydrogen production from water and techno-economic insights	—	—	—
9	Facile synthesis of Pr-doped molecularly imprinted TiO₂ mesocrystals with high preferential photocatalytic degradation performance	—	—	—
10	A facile synthesis of Zn-doped TiO₂ nanoparticles with highly exposed (001) facets for enhanced photocatalytic performance	—	—	—
11	Fe³⁺-Doped Anatase TiO₂ Study Prepared by New Sol-Gel Precursors	—	—	—
12	Plasma technology applications in proton exchange membrane fuel cell systems	China University of Petroleum-Beijing at Karamay, Shanghai Polytechnic University, Yangtze University	China	—
13	Design and synthesis of hybrid nanostructures for sustainable energy and environmental remediation	Central University of Gujarat, Malaviya National Institute of Technology	India	—
14	The synergistic effect of Bi and Fe co-doping on surface functionalization of microporous aluminophosphate photocatalysts for enhanced visible light H₂ generation	—	—	—
15	Ta₂O₅-incorporated in photoinduced electrocatalyst of TiO₂-RuO₂ decorated by PPy-NrGO nanocomposite for boosting overall water splitting	—	—	—
16	Theoretical investigations of optoelectronic properties, photocatalytic performance as a water splitting photocatalyst and band gap engineering with transition metals ...	Government College University, Faisalabad, Government College Women University Faisalabad	Pakistan	—
17	Development of modified TiO₂ for photocatalytic hydrogen production	Lanzhou University of Technology	China	—
18	Highly visible-light-responsive Cu₂O/rGO decorated with Fe₃O₄@SiO₂ nanoparticles as a magnetically recyclable photocatalyst	University of Electronic Science and Technology of China	China	—

No.	Citing paper	Citing institution(s)	Country	S2
19	Synthesis of Fe-TiO2 and Cu-TiO2 Based Materials by Olive Leaves Biotemplating—Application to Hydrogen Production from Glycerol Photoreforming	University of Córdoba	Spain	—
20	Application of TiO2-based nanocomposites for simultaneous H2 production and biodiesel wastewater remediation	Chulalongkorn University, Chulalongkorn University, Petro-mat, The Royal College Of Anesthesiologists Of Thailand, Mahidol University, Office of the Royal Society	Thailand	—
21	Hydrogen production by catalytic reforming process	The University of Tokyo, University of Science and Technology of China	China, Japan	—
22	Enhanced photocatalytic hydrogen production of Fe2O3 decorated TiO2 Nanorods: optimization of hydrothermal temperature	—	—	—
23	Tailoring the Surface Chemistry of Metal Oxides for Applications in Sustainable Catalysis	—	—	—
24	Development and analysis of novel photoelectrochemical reactor for solar based clean hydrogen production	HOPE Clinic, SLAC National Accelerator Laboratory, Stanford University, SLAC National Accelerator Laboratory, Stanford University, McMaster University	Canada, United States	—
25	Research Progress of Modified TiO2 in Photocatalytic Water Splitting for Hydrogen Production	Brookhaven National Laboratory, Dalian University of Technology, Japan Science and Technology Agency, National Institute of Advanced Industrial Science and Technology	China, Japan, United States	—
26	SILVER-MONTMORILLONITE MODIFIED TITANIUM DIOXIDE ASSISTED CARBON NITRIDE NANOCOMPOSITES FOR PHOTOCATALYTIC HYDROGEN ...	—	—	—
27	TiO2	Heilongjiang University	China	—
28	Fe3+-Doped Anatase TiO2 Study Prepared by New Sol-Gel Precursors	—	—	—
29	TiO2	—	—	—

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
Lawrence Livermore National Laboratory	United States	SCImago #1482	6
Helmholtz-Zentrum Dresden-Rossendorf	Germany	SCImago #2809	5
Columbia University	United States	SCImago #65 · THE 20 · QS =38	4
University of Iowa	United States	SCImago #615 · THE 301–350 · QS =530	4
Brown University	United States	SCImago #553 · THE 65 · QS 69	4
Rice University	United States	SCImago #818 · THE =103 · QS =119	4
University of Tennessee	United States	—	3
University of Rochester	United States	SCImago #524 · THE 127 · QS 236	3
Center for Advanced Systems Understanding	Germany	—	3
Harvard University	United States	SCImago #4 · THE =5 · QS 5	2
University of Belgrade	Serbia	SCImago #1090 · THE 1001–1200 · QS 761-770	2
Henan University	China	SCImago #1369	2
University of Michigan	United States	SCImago #43 · THE 23 · QS 45	2
Royal Institute of Technology (KTH)	Sweden	SCImago #497	2
University of Illinois at Urbana-Champaign	United States	SCImago #206 · THE =41	2

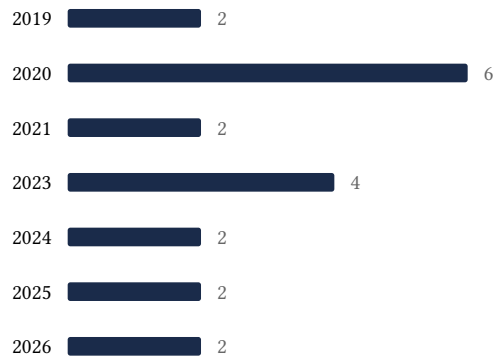
Geographic distribution of citing authors

Country	Citing papers
United States	39
China	32
Germany	16
France	7
United Kingdom	6
India	5
Italy	5
Japan	5
Canada	4
Switzerland	3
Israel	3
Thailand	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	Finite temperature auxiliary field quantum Monte Carlo in the canonical ensemble	48	Dhanasar – Prong 2 (well-positioned)
Contribution 2	The effect of bulk/surface defects ratio change on the photocatalysis of TiO ₂ nanosheet film	80	Dhanasar – Prong 2 (well-positioned)