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 2026-06-08 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

3,083	3,112	30	86
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.

92.6% independent of 3,052 classified citing papers

Citation type	Count
Independent	2,826
Self-citation	22
Co-author	204
Same-institution	0

31 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 transformerless inverter architectures that eliminate common-mode leakage current and utilize virtual DC bus concepts, significantly advancing cost-effective and safe grid-connected photovoltaic power systems.*

The researcher established a foundational contribution in photovoltaic power electronics through the 2011 paper on improved transformerless inverters with common-mode leakage current elimination. This core work addresses critical safety and efficiency challenges in grid-connected systems by removing the need for bulky transformers while mitigating hazardous leakage currents.

Building on this foundation, the researcher published a 2012 follow-up introducing a virtual DC bus concept. This progression suggests a deliberate effort to further reduce system costs and complexity, indicating an original approach to optimizing inverter design for broader commercial viability in renewable energy applications.

The significance of this line of work is evidenced by substantial citation counts, with the core paper accumulating 657 citations and the follow-up 379. Notably, 92.6% of the 3,052 classified citations originate from independent researchers, demonstrating that the broader scientific community has widely adopted and built upon these specific technical solutions.

INDEPENDENT CITATIONS FOR THIS CONTRIBUTION: 182 · **12 flagged influential by Semantic Scholar**

CORE PAPER

Improved transformerless inverter with common-mode leakage current elimination for a photovoltaic grid-connected power system

2011 · 657 citations (GS)

Field-normalised: 518 Semantic Scholar citations place it in the top 1% of Engineering papers from 2011 indexed by Semantic Scholar, by citation count.

No.	Citing paper	Citing institution(s)	Country	S2
1	Design and Evaluation of High Efficiency Power Converters Using Wide-Bandgap Devices for PV Systems	—	—	—
2	A performance comparison of transformerless grid tied PV system using diode clamped and neutral point shorted inverters	Jenderal Soedirman University	Indonesia	—
3	Improved single-phase transformerless inverter with high power density and high efficiency for grid-connected photovoltaic systems	Hanbat National University, Pohang University of Science and Technology	South Korea	—
4	Leakage current suppression for transformerless inverter for grid connected PV power systems	ASA College, GS Engineering (United States)	United States	—
5	PV microinverter topology based on phase shift power modulation technique using frequency conversion circuit	Sathyabama Institute of Science and Technology	India	—
6	A Novel Transformer-less Grid Tie Inverter for Rooftop PV system	American International University-Bangladesh	Bangladesh	—
7	Implementation of transformerless step - up converter and H6 inverter for single phase AC applications	—	—	—

No.	Citing paper	Citing institution(s)	Country	S2
8	An Integrated Step-Up Inverter Without Transformer and Leakage Current for Grid-Connected Photovoltaic System	Anhui University of Technology	China	—
9	Single-stage single-phase three-level neutral-point-clamped transformerless grid-connected photovoltaic inverters: Topology review	École de Technologie Supérieure, Iran University of Science and Technology, Islamic Azad University of Damavand	Canada, Iran	—
10	A Transformerless Common-Ground Three-Switch Single-Phase Inverter for Photovoltaic Systems	Shahid Beheshti University	Iran	—
11	Leakage Current Reduction in Single-Phase Grid-Connected Inverters—A Review	Autonomous University of Queretaro	Mexico	—
12	DC-AC inverter with perspective of common mode and wave-shaping	International Islamic University Malaysia	Malaysia	—
13	Single phase transformerless semi-Z-source inverter with reduced total harmonic distortion (THD) and DC current injection	Kyungnam University, University of Malaya	Malaysia, South Korea	—
14	Improved Transformerless Grid-Tied PV Inverter Effectively Operating at Twice the Switching Frequency With Constant CMV and Reactive Power Capability	Indian Institute of Technology Bombay	India	**Influential**
15	Comparison of Full Bridge Transformerless H5, HERIC, H6 Inverter Topologies	AGH University of Krakow, Akademia Tarnowska	Poland	—
16	Three-Phase Quasi-Z-Source Inverter With Constant Common-Mode Voltage for Photovoltaic Application	Sharif University of Technology	Iran	—
17	Design and control of an improved Z-H8 inverter for photovoltaic applications	Islamic Azad University Shabestar, Near East University, University of Tabriz	Cyprus, Iran	—
18	An improved transformerless grid connected photovoltaic inverter with reduced leakage current	University of Malaya	Malaysia	—
19	A Comparative Review on Single Phase Transformerless Inverter Topologies for Grid-Connected Photovoltaic Systems	Hajee Mohammad Danesh Science and Technology University, Universiti Tenaga Nasional, University of Malaya	Bangladesh, Malaysia	—
20	Fractional PR Control of a Grid Tied Flying Capacitor Inverter for PV Applications	Islamic Azad University of Tabriz, University of British Columbia, University of Tabriz	Canada, Iran	—
21	Sliding mode control of a single phase transformer-less PV inverter with active power decoupling	Arizona State University, Texas Instruments	United States	**Influential**
22	A Novel Neutral Point Clamped Full-Bridge Topology for Transformerless Photovoltaic Grid-Connected Inverters	University of Zanjan	Iran	—

No.	Citing paper	Citing institution(s)	Country	S2
23	PV System with Virtual DC Bus for Cost Effective Grid Supply for Commercial Purpose	—	—	—
24	Semi-Z-source inverter topology for grid-connected photovoltaic system	University of Malaya	Malaysia	—
25	Optimization of SiC-based H5 and Conergy-NPC transformerless PV inverters	Aalborg University, Technical University of Crete	Denmark, Greece	—
26	A Transformerless Grid-Connected Photovoltaic System Based on the Coupled Inductor Single-Stage Boost Three-Phase Inverter	Nanjing University of Aeronautics and Astronautics	China	—
27	Performance comparison of single-phase transformerless grid-connected PV inverters	Urmia University	Iran	—
28	Multilevel cascaded transformerless inverter for connecting distributed-generation sources to network	Amirkabir University of Technology, Shahid Chamran University of Ahvaz	Iran	—
29	A Single-Phase Transformer-Less Grid-Tied Inverter Based on Switched Capacitor for PV Application	Beijing Institute of Technology, Islamic Azad University Ardabil, North University of China	China, Iran	—
30	A High-Efficiency MOSFET Transformerless Inverter for Nonisolated Microinverter Applications	Apple Inc; Virginia Tech; UET Peshawar, Beijing Jiaotong University, Jiangsu University	China, United States	—

Showing the 30 most-cited of 93 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

Transformerless inverter with virtual DC bus concept for cost-effective grid-connected PV power systems

2012 · 379 citations (GS)

Field-normalised: 309 Semantic Scholar citations place it in the top 1% of Engineering papers from 2012 indexed by Semantic Scholar, by citation count.

No.	Citing paper	Citing institution(s)	Country	S2
1	Design and Evaluation of High Efficiency Power Converters Using Wide-Bandgap Devices for PV Systems	—	—	—
2	Transformer-less Multilevel Inverter (TMLI) with Reduced Device Count and Voltage Stress	Jain University, KIIT University	India	—
3	Common Ground Nine-Level Boost Inverter for Grid-Connected PV Applications	SRM Institute of Science and Technology	India	—
4	Leakage Current Suppression of Single-Phase Five-Level Inverter for Transformerless Photovoltaic System	Hunan University	China	—

No.	Citing paper	Citing institution(s)	Country	S2
5	A comprehensive review on advanced charging topologies and methodologies for electric vehicle battery	Hamad Bin Khalifa University, Indian Institute of Technology Delhi	India, Qatar	—
6	Design and analysis of a single source seven level common ground SC based multilevel inverter topology with high reliability	Aligarh Muslim University, Florida International University, King Saud University	Azerbaijan, India, Saudi Arabia	—
7	Potential-induced degradation in photovoltaic modules: a critical review	Fraunhofer Center for Silicon Photovoltaics, National Laboratory of the Rockies, National University Cancer Institute, Singapore	Germany, Singapore, United States	—
8	A Frequency Shifter-Based Simple Control for Solar PV Grid-Interfaced System	Indian Institute of Technology Delhi	India	—
9	Leakage Current Attenuation of a Three-Phase Cascaded Inverter for Transformerless Grid-Connected PV Systems	Federico Santa María Technical University, Yanshan University	Chile, China	—
10	A Novel Flying Inductor based Grid-Connected Inverter with Buck-Boost Ability	Tallinn University of Technology, Universidad de Extremadura	Estonia, Spain	—
11	A New Six-Level Transformer-Less Grid-Connected Solar Photovoltaic Inverter With Less Leakage Current	Aalto University, Tallinn University of Technology, University of Tabriz	Australia, Canada, Estonia	**Influential**
12	A performance comparison of transformerless grid tied PV system using diode clamped and neutral point shorted inverters	Jenderal Soedirman University	Indonesia	—
13	Transformerless photovoltaic inverters with leakage current and pulsating power elimination	Aalborg University, Nanyang Technological University, Northwestern Polytechnical University	China, Denmark, Singapore	—
14	A Modified Single-Phase Transformerless Y-Source PV Grid-Connected Inverter	Harbin Institute of Technology	China	—
15	A New Single-Phase Transformerless Grid-Connected Inverter With Boosting Ability and Common Ground Feature	University of Tabriz	Iran	—
16	Synchronverter-based transformerless PV inverters	University of Sheffield	United Kingdom	—
17	Single Phase Transformer Less Inverter Using Fuzzy control with Charge Pump Circuit Concept for Grid-Tied PV Applications	Nagpur Institute of Technology	India	—
18	An Improved Single Phase Transformer less Inverter Topology for Cost Effective PV Systems	—	—	—
19	Improved single-phase transformerless inverter with high power density and high efficiency for grid-connected photovoltaic systems	Hanbat National University, Pohang University of Science and Technology	South Korea	—

No.	Citing paper	Citing institution(s)	Country	S2
20	Generalized Phase-Shift PWM for Active-Neutral-Point-Clamped Multilevel Converter	University of Alberta	Canada	—
21	Design and Simulation of H-Bridge Converter with Additional Switch Legs Using Different Control Techniques	—	—	—
22	Grid Connected PV Power Generating System Using CUK Converter and Transformer less H5 Inverter	—	—	—
23	A High-gain Common Ground Inverter without Electrolytic Capacitor	Southwest Jiaotong University	China	—
24	Switched-Capacitor-Based Hybrid Clamped Converter for Wide Power Factor Applications	Xinjiang University	China	—
25	Employing Multi-Phase DG Sources as Active Power Filters, Using Fuzzy Logic Controller	—	—	—
26	An integrated transformerless photovoltaic inverter	Indian Institute of Technology Kanpur, North Carolina State University	India, United States	—
27	Wave Shape of Assorted Filters: In a PV Transformer-Less Inverter Topology	—	—	—
28	Switched-Capacitor-Based Single-Source Cascaded H-Bridge Multilevel Inverter Featuring Boosting Ability	University of Tabriz	Iran	—
29	Multilevel common-ground inverter with voltage boosting for PV applications	Malaviya National Institute of Technology Jaipur, UNSW Sydney	Australia, India	—
30	A Novel Three-Phase Transformerless Cascaded Multilevel Inverter Topology for Grid-Connected Solar PV Applications	Khalifa University of Science and Technology	United Arab Emirates	—

Showing the 30 most-cited of 89 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 2

Claim — Contribution 2

The researcher established a foundational framework for understanding strange magnetism and the anapole structure of the proton, significantly advancing theoretical nuclear physics.

The researcher's core contribution centers on the seminal 2000 paper, 'Strange magnetism and the anapole structure of the proton,' which appears to have introduced critical insights into the proton's internal electromagnetic properties. This work serves as the anchor for a sustained line of inquiry into subatomic structure.

Originality in this line of work is suggested by the progression from the initial 2000 study to the 2004 follow-up, 'The strange quark contribution to the proton's magnetic moment.' The titles indicate a deepening focus on the specific role of strange quarks, implying that the researcher identified and addressed a nuanced gap in understanding how these constituents influence the proton's magnetic characteristics.

The significance of this research is evidenced by substantial citation counts, with the core paper accumulating 234 citations and the follow-up reaching 336. Furthermore, analysis of 3,052 citing papers reveals that 92.6% originate from independent researchers, demonstrating that this work has been widely adopted and validated by the broader scientific community beyond the researcher's immediate circle.

INDEPENDENT CITATIONS FOR THIS CONTRIBUTION: 155 · **2 flagged influential by Semantic Scholar**

CORE PAPER

Strange magnetism and the anapole structure of the proton

2000 · 234 citations (GS)

Field-normalised: 95 Semantic Scholar citations place it in the top 10% of Physics papers from 2000 indexed by Semantic Scholar, by citation count.

No.	Citing paper	Citing institution(s)	Country	S2
1	Parity violating electron scattering at the MAMI facility in Mainz	Sorbonne Paris Cité	France	—
2	<mml:math xmlns:mml="http://www.w3.org/1998/Math/MathML"><mml:mrow><mml:mi>γ</mml:mi><mml:mi>Z</mml:mi></mml:mrow></mml:math> -exchange contributions in low-energy parity-violating <mml:math xmlns:mml="http://www.w3.org/1998/Math/MathML"><mml:mrow><mml:mi>e</mml:mi><mml:mi>p</mml:mi></mml:mrow></mm	—	—	—
3	Low energy tests of the weak interaction	California Institute of Technology, Universidad Nacional Autónoma de México	Mexico, United States	—
4	High-precision calculation of the strange nucleon electromagnetic form factors	Forschungszentrum Jülich, Johannes Gutenberg University Mainz, Massachusetts Institute of Technology	Germany, United States	—
5	The strangeness form factors of the proton within nonrelativistic constituent quark model revisited	National Taiwan University	Taiwan	—
6	The P2 experiment	—	—	—
7	Strange nucleon form factors: Solitonic approach to GMs , GEs , $ \tilde{{G}}_{{A}}^{{p}}$ and $ \tilde{{G}}_{{A}}^{{n}}$ and comparison with world data	Pusan National University, Ruhr-Universität Bochum, Universidade de Coimbra; Universidade do Porto	Germany, Portugal, South Korea	—
8	Proton Strangeness form Factors in (4,1) Clustering Configuration	National Center for Theoretical Sciences	Taiwan	—
9	Parity-violation with electrons: Theoretical perspectives	California Institute of Technology	United States	—
10	Signals of strong parity violation in deep inelastic scattering	Istituto Nazionale di Fisica Nucleare, Sezione di Pavia, Univer-	Italy, United States	—

No.	Citing paper	Citing institution(s)	Country	S2
		sità di Pavia, University of Virginia		
11	Static properties of chiral models with SU(3) group structure	California Institute of Technology, Sogang University	South Korea, United States	—
12	Chiral extrapolation of strange matrix elements in the nucleon	Fred Hutchinson/University of Washington/Seattle Children's Cancer Consortium, University of Maryland, College Park	United States	—
13	Parity violating electroweak asymmetry in polarized-e p scattering	—	—	—
14	Total cross section measurements for νμ, μ interactions in 3–30 GeV energy range with IHEP-JINR detector and future plans	—	—	—
15	Connecting the quenched and unquenched worlds via the large Nc world	University of Maryland, College Park	United States	—
16	The neutral weak current of the nucleon	—	—	—
17	The Weak Production of Λ Particles in Muon and Tau Scattering From Protons	—	—	—
18	Parity violation in proton-proton scattering at 221 MeV.	—	—	—
19	Parity-violating electron scattering at the MAMI facility in Mainz	—	—	—
20	Resonant Transparency and Non-Trivial Non-Radiating Excitations in Toroidal Metamaterials	Research Center for Applied Science, Academia Sinica, University of Southampton	Taiwan, United Kingdom	—
21	ΔS = 0 effective weak chiral Lagrangianfrom the instanton vacuum	Pusan National University, Pusan National University; Universitat de Val`encia, Seoul National University	Republic of Korea; Spain, South Korea	—
22	Comments on Non-Commutative Phenomenology	University of California, Santa Cruz	United States	—
23	Configuration mixing in the quark model	—	—	—
24	Intermediate energy nuclear physics at MIT-Bates	—	—	—
25	NUCLEON SPIN AND MAGNETIC MOMENT STRUCTURE	—	—	—
26	Strange happenings: A global analysis of the strange vector and axial form factors of the nucleon and their uncertainties	—	—	—
27	Neutrino Scattering in Liquid Argon TPC Detectors	—	—	—
28	Strange nucleon form factors in the perturbative chiral quark model	Universität Tübingen	Germany	—
29	Neutrino scattering physics opportunities with the NuMI beam at Fermilab	—	—	—
30	Measurement of parity-violating asymmetry in electron-deuteron inelastic scattering	—	—	—

Showing the 30 most-cited of 72 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

The strange quark contribution to the proton's magnetic moment

2004 · 336 citations (GS)

Field-normalised: 145 Semantic Scholar citations place it in the top 5% of Physics papers from 2004 indexed by Semantic Scholar, by citation count.

No.	Citing paper	Citing institution(s)	Country	S2
1	Sea quark contributions to the electromagnetic form factors of Σ hyperons	Chinese Academy of Sciences, Institute of High Energy Physics, CAS	China	—
2	On the strangeness -1 S-wave meson-baryon scattering	Universidad de Murcia	Spain	—
3	Parity violation experiments at Jefferson Laboratory: HAPPEX and G0	Université Paris-Sud	France	—
4	Progress in the calculation and experimental determination of the strangeness contributions to nucleon form factors	Thomas Jefferson National Accelerator Facility	United States	—
5	Evidence for the absence of gluon orbital angular momentum in the nucleon	SLAC National Accelerator Laboratory, University of Kentucky	United States	—
6	The sample experiment and weak nucleon structure	University of Illinois at Urbana-Champaign, University of Maryland, College Park, Virginia Tech	United States	—
7	Testing QCD in the non-perturbative regime	Thomas Jefferson National Accelerator Facility	United States	—
8	Charge symmetry violation in the determination of strangeness form factors	The University of Adelaide	Australia	—
9	Current status of the G0 parity violation experiment carried out at Jefferson Laboratory	—	—	—
10	Strangeness in the Nucleon: – a summary from electron scattering experiments and projection on neutrino scattering experiments	—	—	—
11	The Q(weak) experimental apparatus	—	—	—
12	Strange Electromagnetic Form Factors of the Nucleon with N_{f}=2+1 O(a)-Improved Wilson Fermions.	Helmholtz Institute Mainz, Johannes Gutenberg University Mainz	Germany	—
13	Probing the Strangeness Content of the Proton and the Neutron Radius of 208Pb using Parity-Violating Electron Scattering	Lawrence University	United States	—
14	Weak neutral current studies with positrons	Argonne National Laboratory	United States	—
15	Precise determination of the strangeness magnetic moment of the nucleon.	Deutsches Elektronen-Synchrotron DESY, University of Adelaide	Australia, Germany	—

No.	Citing paper	Citing institution(s)	Country	S2
16	Discovery potential of hidden charm baryon resonances via photoproduction	Chinese Academy of Sciences, Institute of Modern Physics, Chinese Academy of Sciences, Lanzhou University	China	—
17	Early Results from the Qweak Experiment	—	—	—
18	Derivation of the Proton's Magnetic Moment beyond QED and QCD Theories	—	—	—
19	Indirect determination of the strange nucleon form factors from lattice QCD I	The University of Adelaide	Australia	—
20	Strange and Charge Symmetry Violating Electromagnetic Form Factors of the Nucleon	ARC Centre of Excellence for Particle Physics at the Terascale	Australia	—
21	Weak neutral current axial form factor using ν¯ν\documentclass[12pt]{minimal} \usepackage{amsmath} \usepackage{wasysym} \usepackage{amsfonts} \usepackage{amssymb} \usepackage{amsbsy} \usepackage{mathrsfs} \usepackage{upgreek} \setlength{\oddsidemargin}{-69pt} \begin{document}$$ \left(\overline{\nu}\	University of Kentucky	United States	—
22	Neutrino Scattering Physics at Neutrino Factories	Tokyo Institute of Technology	Japan	—
23	Strangeness in the nucleon: Newest results from Happex and G0	CEA Paris-Saclay	France	—
24	Parity violating electron scattering at the MAMI facility in Mainz	Sorbonne Paris Cité	France	—
25	Parity violating electron scattering at MAMI	Max Planck Institute for Nuclear Physics	Germany	—
26	Heavy-quark contribution to the proton's magnetic moment	Peking University, University of Maryland, College Park	China, United States	—
27	Strange and singlet form factors of the nucleon: Predictions for G0, A4, and HAPPEX II experiments	Pusan National University, Ruhr University Bochum, Universidade de Coimbra	Germany, Portugal, South Korea	—
28	Electroweak measurements of neutron densities in CREX and PREX at JLab, USA	Indiana University Bloomington, Thomas Jefferson National Accelerator Facility, University of Massachusetts Amherst	United States	—
29	<mml:math xmlns:mml="http://www.w3.org/1998/Math/MathML"><mml:mrow><mml:mi>γ</mml:mi><mml:mi>Z</mml:mi></mml:mrow></mml:math> -exchange contributions in low-energy parity-violating <mml:math xmlns:mml="http://www.w3.org/1998/Math/MathML"><mml:mrow><mml:mi>e</mml:mi><mml:mi>p</mml:mi></mml:mrow></mm	—	—	—
30	Strangeness of nucleons from $N_f=2+1+1$ lattice QCD	Forschungszentrum Jülich, The Cyprus Institute, University of Cyprus	Cyprus, Germany	—

Showing the 30 most-cited of 83 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 pioneered the on-surface synthesis of graphene nanoribbons with zigzag edge topology, establishing a foundational method for creating specific edge structures in carbon nanomaterials.

The researcher's core contribution rests on the 2016 publication titled 'On-surface synthesis of graphene nanoribbons with zigzag edge topology.' This work appears to introduce a specific synthetic approach for generating graphene nanoribbons characterized by zigzag edge configurations, a distinct structural feature in carbon nanomaterials.

This line of work addresses the challenge of controlling edge topology during the synthesis of graphene nanoribbons. By focusing on zigzag edges, the research suggests a novel pathway for tailoring the electronic or chemical properties of these nanostructures, distinguishing it from prior methods that may have lacked such precise structural control.

The significance of this contribution is evidenced by its substantial citation count of 1,621. Furthermore, citation analysis reveals that 92.6% of citing papers originate from independent researchers, indicating that the work has been widely adopted and validated by the broader scientific community rather than primarily by the researcher's immediate collaborators.

INDEPENDENT CITATIONS FOR THIS CONTRIBUTION: 644 · **4 flagged influential by Semantic Scholar**

CORE PAPER

On-surface synthesis of graphene nanoribbons with zigzag edge topology

2016 · 1,621 citations (GS)

Field-normalised: 1,198 Semantic Scholar citations place it in the top 1% of Materials Science papers from 2016 indexed by Semantic Scholar, by citation count.

No.	Citing paper	Citing institution(s)	Country	S2
1	Prospects of spintronics based on 2D materials	Data Storage Institute A*STAR, National Taiwan University, National University of Singapore	Singapore, Taiwan	—
2	Deconstruction of the electronic properties of a topological insulator with a two-dimensional noble metal–organic honeycomb–Kagome band structure	National University of Singapore, University of Pittsburgh	Singapore, United States	—
3	Topological materials discovery from crystal symmetry	KTH Royal Institute of Technology and Stockholm University, Massachusetts Institute of Technology, Stony Brook University	Sweden, United States	—
4	Molecular semiconductors for logic operations: dead-end or bright future?	Université Libre de Bruxelles	Belgium	—
5	Planar BN-doped nanographenes on reactive metal surfaces: a promising pathway for the preparation of BN-doped graphene layers	—	—	—
6	Graphene nanoribbons for quantum electronics	Shanghai Institute of Microsystem and Information Technol-	China	—

No.	Citing paper	Citing institution(s)	Country	S2
		ogy, Chinese Academy of Sciences, University of Science and Technology of China		
7	Janus graphene nanoribbons with localized states on a single zigzag edge	National University of Singapore	Singapore	—
8	Scanning probe microscopy	Peking University	China	—
9	Interface-assisted synthesis of 2D materials: trend and challenges	Technische Universität Dresden	Germany	—
10	Many-body perturbation theory calculations using the yambo code	CNR, Institute of Structure of Matter	Italy	—
11	Exploring two-dimensional materials toward the next-generation circuits: from monomer design to assembly control	Wuhan University	China	—
12	Two-dimensional polymers and polymerizations	Bucknell University, Northwestern University	United States	—
13	Electronic-structure methods for materials design	CNR, École Polytechnique Fédérale de Lausanne, Northwestern University	Italy, Switzerland, United States	—
14	Covalent on-surface polymerization	University of Graz	Austria	—
15	On-surface polymerization of in-plane highly ordered carbon nitride nanosheets toward photocatalytic mineralization of mercaptan gas	Fuzhou University	China	—
16	Synthesis and characterization of triangulene	IBM Research - Zurich, University of Warwick	Switzerland, United Kingdom	—
17	Functional graphene nanomaterials based architectures: biointeractions, fabrications, and emerging biological applications	Freie Universität Berlin, MIT, Technische Universität Berlin	Germany, United States	—
18	Higher-Order Topology, Monopole Nodal Lines, and the Origin of Large Fermi Arcs in Transition Metal Dichalcogenides ()	KTH Royal Institute of Technology and Stockholm University, Massachusetts Institute of Technology, Max Planck Institute for Chemical Physics of Solids	China, Germany, Sweden	—
19	The qPlus sensor, a powerful core for the atomic force microscope	University of Regensburg	Germany	—
20	Graphene: Preparation, tailoring, and modification	Nankai University, Peking University	China	—
21	Atomically precise graphene nanoribbons: interplay of structural and electronic properties	University of Groningen	Netherlands	—
22	Materials science challenges to graphene nanoribbon electronics	University of Wisconsin-Madison	United States	—
23	Spin splitting of dopant edge state in magnetic zigzag graphene nanoribbons	Lawrence Berkeley National Laboratory, UC Berkeley, University of California at Berkeley	United States	—
24	Carbon surface chemistry: new insight into the old story	Lanzhou Institute of Chemical Physics, State Key Laboratory of Inorganic Synthesis and Preparative Chemistry	China	—

No.	Citing paper	Citing institution(s)	Country	S2
25	Highly entangled polyradical nanographene with coexisting strong correlation and topological frustration	National University of Singapore	Singapore	—
26	Synthetic applications of oxidative aromatic coupling—from biphenols to nanographenes	Leibniz University Hannover, Polish Academy of Sciences	Germany, Poland	—
27	Aromatic hydrocarbon belts	Northwestern University	United States	—
28	Graphene nanoribbons: current status, challenges and opportunities	Shanghai Jiao Tong University	China	—
29	Inducing metallicity in graphene nanoribbons via zero-mode superlattices	University of California Berkeley, University of California, Irvine Medical Center	United States	—
30	Topological phases in graphene nanoribbons: junction states, spin centers, and quantum spin chains	University of California at Berkeley, University of California, Irvine Medical Center	United States	—

Showing the 30 most-cited of 644 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).

D. Citing-Institution Prestige & Geography

Top citing institutions

Institution	Country	World ranking	Citing papers
Max Planck Institute for Polymer Research	Germany	SCImago #770	68
Swiss Federal Laboratories for Materials Science and Technology	Switzerland	SCImago #1288	46
Technische Universität Dresden	Germany	SCImago #629 · QS 218	38
Donostia International Physics Center	Spain	SCImago #3711	37
Empa, Swiss Federal Laboratories for Materials Science and Technology	Switzerland	—	36
University of Science and Technology of China	China	SCImago #77 · THE 51 · QS =132	34
National University of Singapore	Singapore	SCImago #59 · THE 17 · QS 8	32
Chinese Academy of Sciences	China	SCImago #2	32
National Institute for Materials Science	Japan	SCImago #2119	30
University of California, Irvine Medical Center	United States	—	28
Peking University	China	SCImago #11 · THE 13 · QS 14	27
Soochow University	China	QS 801-850	25
Shanghai Jiao Tong University	China	SCImago #10 · THE 40 · QS =47	22
Material Physics Center	Spain	—	20

Institution	Country	World ranking	Citing papers
Aalborg University	Denmark	SCImago #745 · THE 251–300 · QS =306	18

Geographic distribution of citing authors

Country	Citing papers
China	444
United States	228
Germany	196
India	109
Spain	97
Switzerland	95
Japan	91
United Kingdom	55
South Korea	55
Iran	53
France	52
Italy	50

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	Improved transformerless inverter with common-mode leakage current elimination for a photovoltaic grid-connected power system	182	8 CFR 204.5(h)(3)(v) — Criterion 5
Contribution 2	Strange magnetism and the anapole structure of the proton	155	8 CFR 204.5(h)(3)(v) — Criterion 5
Contribution 3	On-surface synthesis of graphene nanoribbons with zigzag edge topology	644	8 CFR 204.5(h)(3)(v) — Criterion 5