

# Hayk Ashot Zakaryan

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## Research Institute of Physics

Computational Materials Science Laboratory

Head of laboratory

## Education

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<b>Institution</b>	Yerevan State University
<b>Faculty</b>	Radiophysics
<b>Date</b>	2014 - 2017
<b>Degree name</b>	PhD student

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<b>Institution</b>	Yerevan State University
<b>Faculty</b>	Radiophysics
<b>Date</b>	2012 - 2014
<b>Degree name</b>	Masters

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<b>Institution</b>	Yerevan State University
<b>Faculty</b>	Radiophysics
<b>Date</b>	2008 - 2012
<b>Degree name</b>	Bachelor

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## Scientific Rank/degree

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<b>Institution</b>	Yerevan State University
<b>Date</b>	2017
<b>Degree name</b>	Candidate
<b>Specialty</b>	Physico-mathematical sciences
<b>Scientific Supervisor</b>	Vladimir Aroutiounian
<b>Research Topic</b>	Investigation of gas adsorption on the tin dioxide surface using density functional theory

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## Language skills

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Հայերեն English Русский

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## Publications

*Article*

### **Computational screening for novel solid-state electrolytes in Li<sub>3</sub>MX<sub>6</sub> composition**

Hayk A. Zakaryan, Olgert L. Dallakyan, Alexey P. Maltsev, Ilya V. Chepkasov, Misha A. Aghamalyan,

Areg A. Hunanyan, Nane Z. Petrosyan, Mikayel S. Chobanyan, Mikayel T. Sahakyan,  
Luiza G. Khachatryan, Artem R. Oganov  
Journal of Energy Chemistry 2026 495-504

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*Article*

**Glaser Heterocoupling Reaction for the Synthesis of Enantiomerically Enriched Unnatural  $\alpha$ -Amino Acids Incorporating Asymmetric Diyne Moieties: Mechanistic Insights and Optimization**

Liana Hayriyan, Anna Tovmasyan, Anna Grigoryan, Karapet Ghazaryan, Barbara Biondi,  
Olgert L. Dallakyan, Mikayel S. Chobanyan, Hayk Zaqaryan, Ashot Saghyan, Anna Mkrtchyan  
ACS Omega 2025 A-G

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*Article*

**A DFT study on an 18-crown-6-like-N8 structure as a material for metal ion storage: stability and performance**

Hayk Zakaryan, Irina I. Piyanzina, Sadegh Kaviani, Regina M. Burganova, Oleg V. Nedopekin  
Sustainable Energy and Fuels 2025 5075-5084

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*Article*

**DFT analysis of furan-based covalent organic framework as electrode materials for lithium and calcium ion batteries**

Irina Piyanzina, Aigul Shamsieva, Alexander Evseev, Sadegh Kaviani, Oleg Nedopekin, Hayk Zakaryan  
Computational and Theoretical Chemistry 2025 115445

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*Article*

**Accelerated composition optimization of hybrid perovskites via data-driven materials design, DFT calculations and synthesis**

Sona Grigoryan, Nane Petrosyan, Gurgen Kolotyan, Arpine Kozmalyan, Varazdat Avetisyan,  
Hayk Zakaryan, Michael J. Schöning, Arevik Asatryan, Hayk Khachatryan  
Materials and Design 2025 114902

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*Article*

**DFT investigation of magnetocrystalline anisotropy in Fe, Co, Pd<sub>0.97</sub>Co<sub>0.03</sub> and Pd<sub>0.97</sub>Fe<sub>0.03</sub> systems: from bulk to thin-films**

Irina I. Piyanzina, Regina M. Burganova, Hayk Zakaryan, Zarina I. Minnegulova, Igor V. Yanilkin,  
Amir I. Gumarov  
European Physical Journal Plus 2025 949

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*Article*

**Material hardness descriptor derived by symbolic regression**

Hayk A. Zakaryan, Christian Tantardini, Zhong-Kang Han, Tariq Altalhi, Sergey V. Levchenko,  
Alexander G. Kvashnin, Boris I. Yakobson  
Journal of Computational Science 2024 102402

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*Article*

**Gas sensing properties of two dimensional tin oxides: A DFT study**

Areg Hunanyan, Nane Petrosyan, Hayk Zakaryan  
Applied Surface Science 2024 160814

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*Article*

**Synthesis and evaluation of new mono- and binuclear salen complexes for the  $\alpha$ -alkylation reaction of amino acid substrates as chiral phase transfer catalysts**

Anahit M. Hovhannisyan, Anna S. Tovmasyan, Anna F. Mkrtchyan, Karapet R. Ghazaryan,

Ela V. Minasyan, Olgert L. Dallakyan, Mikayel S. Chobanyan, Hayk Zakaryan, Giovanni N. Roviello,

Ashot S. Saghyan

Molecular Catalysis 2024 114618

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*Article*

**Computational Search and Stability Analysis of Two-Dimensional Tin Oxides**

Areg A. Hunanyan, Vladimir M. Aroutiounian, Hayk A. Zakaryan

Journal of Physical Chemistry C 2022 4647-4654

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*Article*

**Computational Design of Gas Sensors Based on V3S4 Monolayer**

Hayk A. Zakaryan, Misha A. Aghamalyan, Yevgeni Sh. Mamasakhlisov, Ilya V. Chepkasov,

Ekaterina V. Sukhanova, Alexander G. Kvashnin, Anton M. Manakhov, Zakhar I Popov,

Dmitry G. Kvashnin

Nanomaterials 2022 774

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*Article*

**2D-Mo3S4 phase as promising contact for MoS2**

H.A. Zakaryan, M.A. Aghamalyan, E.V. Sukhanova, A.G. Kvashnin, L.A. Bereznikova, D.G. Kvashnin,

Z.I. Popov

Applied Surface Science 2022 152971

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*Article*

**Adsorption of Hydrogen Peroxide on Two-Dimensional Transition Metal Chalcogenides**

M. A. Aghamalyan, V. M. Aroutiounian, E. S. Mamasakhlisov, E. V. Sukhanova, A. G. Kvashnin, Z. I. Popov,

A. A. Zakaryan

Journal of Contemporary Physics (Armenian Academy of Sciences) 2022 170-173

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*Article*

**Map of Two-Dimensional Tungsten Chalcogenide Compounds (W-S, W-Se, W-Te) Based on USPEX Evolutionary Search**

E. V. Sukhanova, A. G. Kvashnin, M. A. Agamalyan, H. A. Zakaryan, Z. I. Popov

JETP Letters 2022 292-296

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*Article*

**Computational Search and Stability Analysis of Two-Dimensional Tin Oxides**

Areg A. Hunanyan, Hayk A. Zakaryan, Vladimir M. Aroutiounian

Journal of Physical Chemistry C 2022 4647-4654

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*Article*

**Influence of UV Rays on the Volt-Capacity Characteristic of SnO<sub>2</sub>:Co Sensor of Vapors of Hydrogen Peroxide**

M. S. Aleksanyan, A. G. Sayunts, A. A. Zakaryan, V. M. Aroutiounian, V. M. Arakelyan, G. E. Shakhnazary

Journal of Contemporary Physics (Armenian Academy of Sciences) 2020 151-156

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*Article*

**Investigations of Sensors for Detection of Hydrogen Peroxide Vapors under the Influence of UV Illumination**

M. S. Aleksanyan, A. G. Sayunts, A. A. Zakaryan, V. M. Harutyunyan, V. M. Arakelyan,

G. E. Shakhnazaryan

Journal of Contemporary Physics (Armenian Academy of Sciences) 2020 205-212

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*Article*

**First-Principles Study of the Interaction of H<sub>2</sub>O<sub>2</sub> with the SnO<sub>2</sub> (110) Surface**

M. A. Aghamalyan, A. A. Hunanyan, V. M. Aroutiounian, M. S. Aleksanyan, A. G. Sayunts, H. A. Zakaryan

Journal of Contemporary Physics (Armenian Academy of Sciences) 2020 235-239

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*Article*

**Computational Search for New W–Mo–B Compounds**

Hayk A. Zakaryan, Alexander G. Kvashnin, Christian Tantardini, Yulia A. Kvashnina, Artem R. Oganov

Chemistry of Materials 2020 7028–7035

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*Article*

**ВЛИЯНИЕ УЛЬТРАФИОЛЕТОВЫХ ЛУЧЕЙ НА ВОЛЬТ- ЕМКОСТНУЮ ХАРАКТЕРИСТИКУ SnO<sub>2</sub>:Co СЕНСОРА ПАРОВ ПЕРЕКИСИ ВОДОРОДА**

М.С. АЛЕКСАНЯН, А.Г. САЮНЦ, А.А. ЗАКАРЯН, В.М. АРУТЮНЯН, В.М. АРАКЕЛЯН, Г.Э. ШАХНАЗАРЯН

Известия НАН РА. Физика (Journal of Contemporary Physics (Armenian Academy of Sciences) 2020 218-227

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*Article*

**ИССЛЕДОВАНИЕ СЕНСОРА ДЛЯ ОБНАРУЖЕНИЯ ПАРОВ ПЕРЕКИСИ ВОДОРОДА ПОД ДЕЙСТВИЕМ УЛЬТРАФИОЛЕТОВОГО ИЗЛУЧЕНИЯ**

М.С. АЛЕКСАНЯН, А.Г. САЮНЦ, А.А. ЗАКАРЯН, В.М. АРУТЮНЯН, В.М. АРАКЕЛЯН, Г.Э. ШАХНАЗАРЯН

Известия НАН РА. Физика (Journal of Contemporary Physics (Armenian Academy of Sciences) 2020 312-324

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*Article*

**Effects of UV Irradiation on the Sensing Properties of Co-doped SnO<sub>2</sub> Thin Film for Ethanol Detection**

Mikayel Aleksanyan, Artak Sayunts, Hayk Zakaryan, Vladimir Aroutiounian, Gohar Shahnazaryan,

Valeri Arakelyan

International Journal on Advances in Systems and Measurements 2020 312-321

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*Article*

**Stable and hard hafnium borides: A first-principles study**

Congwei Xie, Qi Zhang, Hayk A. Zakaryan, Hao Wan, Ning Liu, Alexander G. Kvashni, Artem R. Oganov

Journal of Applied Physics 2019 205109(1-9)

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*Article*

**Formation Energy of Intrinsic and Impurity Defects in Tin Dioxide**

A. A. Hunanyan, M. A. Aghamalyan, V. M. Aroutiounian, H. A. Zakaryan

Journal of Contemporary Physics (Armenian Academy of Sciences) 2019 282–286

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*Article*

**New Tungsten Borides, their Stability and Outstanding Mechanical Properties**

Hayk A. Zakaryan, Alexander G. Kvashnin, Changming Zhao, Yifeng Duan, Yulia A. Kvashnina,

Congwei Xie, Huafeng Dong, Artem R Oganov  
Journal of Physical Chemistry Letters 2018 3470-3477

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*Article*

**CO gas adsorption on SnO<sub>2</sub> surfaces: density functional theory study**

Hayk Zakaryan, Vladimir Aroutiounian

Sensors & Transducers 2017 50-56

<http://www.sensorsportal.com/HTML/DIGEST/Submission.htm>

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*Article*

**Исследование структуры и дефектов легированного кобальтом диоксида олова: теория функциональной плотности и эмпирические силовые потенциалы**

А. А. Закарян, В. М. Арутюнян

Известия НАН РА. Физика (Journal of Contemporary Physics (Armenian Academy of Sciences) 2017 312-320

<http://www.flib.sci.am/eng/Fizika/Frame.html>

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*Article*

**Adsorption of CO gas molecules on SnO<sub>2</sub> surface**

V.M. Aroutiounian, H.A. Zakaryan

International Scientific Journal for Alternative Energy and Ecology 2017 91-99

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*Article*

**ADSORPTION OF CO MOLECULES ON SNO<sub>2</sub> (110), (100), (101), (001) SURFACE ORIENTATIONS: DENSITY FUNCTIONAL THEORY STUDY**

H. Zakaryan

SEMICONDUCTOR MICRO- AND NANOELECTRONICS. PROCEEDINGS OF THE ELEVENTH INTERNATIONAL CONFERENCE  
2017 88-91

<http://icsmn.yasu.am/11th%20ICSMN-Proceedings.pdf>

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*Article*

**Stable reconstruction of the (110) surface and its role in pseudocapacitance of rutile-like RuO<sub>2</sub>**

Hayk A. Zakaryan, Alexander G. Kvashnin, Artem R. Oganov

Scientific Reports 2017 1 - 9

<https://www.nature.com/articles/s41598-017-10331-z>

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*Article*

**Adsorption of the H and H<sub>2</sub>O on SnO<sub>2</sub> Surfaces in an O<sub>2</sub> Environment: Density Functional Theory Study**

H. Zakaryan

Armenian Journal of Physics 2016 283-293

<http://ajp.asj-oa.am/>

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*Article*

**Влияние влажности на запрещенную зону графена**

А.А.Закарян, В.М. Арутюнян

Известия НАН РА. Физика (Journal of Contemporary Physics (Armenian Academy of Sciences) 2015 350-356

*Conference*

**Ab initio investigation of CO gas sensing mechanism on SnO<sub>2</sub> surfaces**

H. A. Zakaryan, V. M. Aroutiounian

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*Conference*

**Cobalt impurity in thin dioxide and its influence in hydrogen sensors**

H. Zakaryan, V. Aroutiounian, M. Aghamalyan

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*Conference*

**UV-assisted Chemiresistive Alcohol Sensor Based on Cobalt Doped Tin Dioxide**

Mikayel Aleksanyan, Artak Sayunts, Hayk Zakaryan, Vladimir Aroutiounian, Valeri Arakelyan,

Gohar Shahnazaryan

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