

# Karen Martin Gambaryan

☎ 23-11

✉ kgambaryan@ysu.am

## Institute of Physics

Chair of Materials Science and Nanotechnology

Professor

## Education

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<b>Institution</b>	Yerevan State University
<b>Faculty</b>	Radiophysics
<b>Date</b>	1976 - 1981
<b>Degree name</b>	Qualified specialist

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## Scientific Rank/degree

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<b>Institution</b>	Yerevan State University
<b>Date</b>	2015
<b>Degree name</b>	Professor
<b>Specialty</b>	Physico-mathematical sciences

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<b>Institution</b>	Yerevan State University
<b>Date</b>	2013
<b>Degree name</b>	Doctor
<b>Specialty</b>	Physico-mathematical sciences
<b>Research Topic</b>	The Growth and Investigation of Epitaxial Semiconducting Nanostructures and Mid-Infrared Photodetectors Based on Them

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## Language skills

English Русский

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## Work experience

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<b>Institution</b>	Yerevan State University, Institute of Physics, Chair of Physics of Semiconductors and Microelectronics
<b>Period of time</b>	2019 till now
<b>Rank/degree</b>	Head of Chair, Full Professor

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## Scientific interests

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- Physics of Semiconductors and Semiconductor Devices; Semiconductor Materials and Devices Science and Technology; III-V Compound Semiconductors Thin Films Epitaxy; Infrared Devices; Renewable Energy Sources; Thermo-Photovoltaic Devices; Nano-Electronics a

## Participation in international conferences and seminars

<b>16/07/2023 - 20/07/2023</b>	World Renewable Energy Congress-XXII (WREC-XXII) Kuala Lumpur Convention Center Malaysia
<b>22/08/2017 - 24/08/2017</b>	European Advanced Materials Congress (EAMC-2017) Stockholm Sweden
<b>10/06/2019 - 12/06/2019</b>	5th Global Congress & Expo on Materials Science & Engineering (GCEMSE-2019) Osaka Japan
<b>31/08/2020 - 04/09/2020</b>	The 28th Condensed Matter General Conference (Condensed Matter Divisions of the Spanish Royal Physics Society and the European Physical Society) Madrid Spain
<b>21/07/2021 - 25/07/2021</b>	World Renewable Energy Congress (WREC-2020) Lisbon Portugal

## Membership

<b>Institution</b>	Fellow of the International Association of Advanced Materials
<b>Period of time</b>	2020 till now
<b>Institution</b>	“World Renewable Energy Network and Council (WREN/WREC)”
<b>Period of time</b>	1998 till now
<b>Institution</b>	“Asia-Pacific Chemical, Biological and Environmental Engineering Society (APCBEEES)”
<b>Period of time</b>	2011 till now
<b>Institution</b>	Member of the “International Association of Academy of Sciences” (MAAN, Moscow) Scientific Council on “Functional materials for electronics”
<b>Period of time</b>	2017 till now

## State awards and honorary titles

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2023 World Renewable Energy Network Pioneer Award (2023)

2017 International Association of Advanced Materials (IAAM) Gold Medal

2019 Gold medal of the Yerevan State University

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## Publications

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*Article*

**Energy level alignment of confined hole states in  $\text{InAs}_{1-x-y}\text{Sb}_x\text{Py}$  asymmetric double quantum dots for single-photon energy up- and downconversion**

Karen M. Gambaryan, Owen Ernst, Torsten Boeck, Oliver Marquardt

Applied Physics Letters 2025 061102

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*Article*

**In(AsSbP) Graded Composition Quantum Dots, Quantum Rings and Quantum Dot Molecules**

Karen Gambaryan, Oliver Marquardt, Lilit Yeranyan, Torsten Boeck

Physics of Quantum Rings (NanoScience and Technology) 2025 235-275

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*Article*

**Miscibility Gaps Analysis for BN-Si-C Ternary Material System**

L. S. Yeranyan, A. V. Margaryan, K. M. Gambaryan

Journal of Contemporary Physics (Armenian Academy of Sciences) 2024 91-96

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*Article*

**Photoconductive Cells Based on Type-II Conical Quantum Dots for Thermophotovoltaic and Other Mid-infrared Applications**

Karen M. Gambaryan

Transition Towards a Carbon Free Future: Selected Papers from the World Renewable Energy Congress (WREC) 2023

2024 31-37

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*Article*

**Near-Infrared Optoelectronic Non-Invasive Sensing Technology for Glucose Concentration Monitoring in Liquid Solutions**

K. Gambaryan, M. Sahakyan, G. Manukyan

Armenian Journal of Physics 2024 101-109

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*Article*

**Energy level alignment of confined hole states in  $\text{InAs}_{1-x-y}\text{Sb}_x\text{Py}$  double quantum dots**

Karen M. Gambaryan, Owen Ernst, Torsten Boeck, Oliver Marquardt

Weierstraß-Institut für Angewandte Analysis und Stochastik (Leibniz-Institut im Forschungsverbund, Berlin e.V.), Proceedings (Preprint)

2023 1-8

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*Article*

**Nano-Scale Architecture of Quantum-Size Structures at the Growth From Quaternary In-As-Sb-P Liquid Phase on  $\text{InAs}(100)$  Substrate**

K. M. Gambaryan

Article

**Нано-архитектура квантооразмерных структур при выращивании из четырехкомпонентной In-As-Sb-P жидкой фазы на подложке InAs(100)**

К. М. Гамбарян

Известия НАН РА. Физика (Journal of Contemporary Physics (Armenian Academy of Sciences) 2022 212–233

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Article

**ГЕОМЕТРИЧЕСКИЕ ОСОБЕННОСТИ И ЧИСЛЕННЫЙ АНАЛИЗ ТРАНСФОРМАЦИИ ПОВЕРХНОСТИ МИКРО- И НАНОСТРУКТУР СОСТАВА InAsSbP ПРИ ЗАРОДЫШЕОБРАЗОВАНИИ ИЗ ЖИДКОЙ ФАЗЫ**

Ղամբարյան Կարեն Մարտիրոսի, Հարությունյան Վլադիմիր Միխայիլի

Известия НАН РА. Физика (Journal of Contemporary Physics (Armenian Academy of Sciences) 2021 208-217

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Article

**Geometric Features and Numerical Analysis of InAsSbP Composition Micro- and Nanostructures Shape Transformation at Nucleation from Liquid Phase**

K. M. Gambaryan, V. M. Aroutiounian

Journal of Contemporary Physics (Armenian Academy of Sciences) 2021 133–138

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Article

**Nucleation Chronology and Electronic Properties of InAs<sub>1-x-y</sub>Sb<sub>x</sub>Py Graded Composition Quantum Dots Grown on an InAs(100) Substrate**

Karen M. Gambaryan, Torsten Boeck, Achim Trampert, Oliver Marquardt

ACS Applied Electronic Materials 2020 646-650

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Article

**Micro- and nano-scale engineering and structures shape architecture at nucleation from In-As-Sb-P composition liquid phase on an InAs(100) surface**

Karen M. Gambaryan, Marquardt Oliver, Boeck Torsten, Trampert Achim

Proceedings (Preprint) of Weierstraß-Institut für Angewandte Analysis und Stochastik (Leibniz-Institut im Forschungsverbund, Berlin e.V.) 2020 2775(1-22)

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Article

**CdTe-ZnTe-HgTe Material System: Solid Solutions Miscibility Analysis**

K. M. Gambaryan, V. M. Aroutiounian, A. K. Simonyan, M. K. Gambaryan

Journal of Contemporary Physics (Armenian Academy of Sciences) 2020 334–338

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Article

**МАТЕРИАЛЬНАЯ СИСТЕМА CdTe-ZnTe-HgTe: АНАЛИЗ СМЕШИВАЕМОСТИ ТВЕРДЫХ РАСТВОРОВ**

К.М. ГАМБАРЯН, В.М. АРУТЮНЯН, А.К. СИМОНЯН, М.К. ГАМБАРЯН

Известия НАН РА. Физика (Journal of Contemporary Physics (Armenian Academy of Sciences) 2020 519–526

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Article

## **Nanostructured P-N Junctions and Photoconductive Cells for Thermal Energy Conversion**

Karen M. Gambaryan, Vladimir M. Aroutiounian, Martin K. Gambaryan

Innovative Renewable Energy: Sustainable Energy Development and Innovation 2020 47-51

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*Article*

### **Nucleation chronology and electronic properties of InAsSbP graded composition quantum dots grown on InAs(100) substrate**

Karen M. Gambaryan, Torsten Boeck, Achim Trampert, Oliver Marquardt

Proceedings (Preprint) of Weierstraß-Institut für Angewandte Analysis und Stochastik (Leibniz-Institut im Forschungsverbund, Berlin e.V.)

2019 1-10

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*Article*

### **МЕХАНИЗМ ЗАРОДЫШЕОБРАЗОВАНИЯ И РАСЧЕТ ПОЛНОЙ ЭНЕРГИИ НАНОСТРУКТУР В МАТЕРИАЛЬНОЙ СИСТЕМЕ CdTe-ZnTe-HgTe**

К.М. ГАМБАРЯН, В.М. АРУТЮНЯН, Г.А. АВETИСЯН, А.К. СИМОНЯН, М.К. ГАМБАРЯН

Известия НАН РА. Физика (Journal of Contemporary Physics (Armenian Academy of Sciences) 2019

478-484

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*Article*

### **Nucleation Mechanism and Nanostructures Total Energy Calculation in CdTe-ZnTe-HgTe Material System**

K. M. Gambaryan, V. M. Aroutiounian, G. A. Avetisyan, A. K. Simonyan, M. K. Gambaryan

Journal of Contemporary Physics (Armenian Academy of Sciences) 2019 351-355

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*Article*

### **Narrow bandgap quantum dot diode structures and photoresistors for thermo-photovoltaic and infrared applications**

Karen M. Gambaryan

Advanced Materials Letters 2018 112-115

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*Article*

### **Fabrication and Investigation of Photovoltaic Converters Based on Polycrystalline Silicon Grown on Borosilicate Glass**

K. M. Gambaryan, V. G. Harutyunyan, V. M. Aroutiounian, T. Boeck, R. Bansen, C. Ehlers

Journal of Contemporary Physics (Armenian Academy of Sciences) 2018 351-357

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*Article*

### **Узкозонные фотодетекторы среднего инфракрасного диапазона на основе квантовых точек InAsSbP**

Հարուբյուրված Վ.Գ., Դամբարյան Վ.Մ., Հարուբյուրված Վ.Մ.

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

60-67

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

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*Article*

### **Narrow Bandgap Mid-Infrared Photodetectors Based on InAsSbP Quantum Dots**

K.M.Gambaryan, V.G.Harutyunyan, V.M.Aroutiounian

Journal of Contemporary Physics (Armenian Academy of Sciences) 2017 43-48

<http://www.springer.com/physics/particle+and+nuclear+physics/journal/11958>

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Article

**Magnetoresistance Aharonov-Bohm (MAB) oscillations in elongated quantum dots**

Ղամբարյան Կարեն Մարտինի, Հարությունյան Վարդան Գագիկի,

Հարությունյան Վլադիմիր Միքայելի, Երանյան Լիլիթ Սուրենի

Journal of Physics: Conference Series 2017 012021

<http://iopscience.iop.org/journal/1742-6596>

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Article

**Magnetoresistance Aharonov-Bohm oscillations in oblate ellipsoidal quantum dots**

K.M.Gambaryan, V.G.Harutyunyan, V.M.Aroutiounian, L.S.Yeranyan

Вестник Российско-Армянского Университета: Физико-математические и естественные науки 2017

85-90

<http://science.rau.am/rus/50/701>

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Article

**Nanostructures Nucleation Features and Miscibility Analysis in Zinc-Blend and Wurtzite GaN-InN-AlN Material System**

A.K. Simonya, K.M. Gambaryan, V.M. Aroutiounian

Journal of Nanoscience and Technology 2017 253-255

<http://www.jacsdirectory.com/jnst>

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Article

**Growth features and nucleation mechanism of Ga<sub>1-x</sub>Al<sub>x</sub>N material system on GaN substrate**

Arpine K. Simonyan, Karen M. Gambaryan, Vladimir M. Aroutiounian

Advances in Nano Research 2017 303-311

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Article

**Silicon on glass grown from indium and tin solutions**

R. Bansen, C. Ehlers, T. Teubner, K. Böttcher, K. Gambaryan, J. Schmidtbauer, T. Boeck

Journal of Photonics for Energy 2016 025501 (10 pages)

<https://spie.org/publications/journals/journal-of-photonics-for-energy>

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Article

**The Growth and Characterization of InAsSbP Composition Semiconductor Epitaxial Strain-Induced Islands and Quantum Dots**

Հարությունյան Վ.Մ., Ղամբարյան Կ.Մ.

Հայաստանի ճարտարագիտական ակադեմիայի լրագրեր 2016 96-103

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Article

**Competing nucleation of islands and nanopyts in zinc-blend III-nitride quaternary material system**

K M Gambaryan, V M Aroutiounian, A.K. Simonyan, L S Yeranyan

Journal of Physics: Conference Series 2016 012009 (4 pages)

<http://iopscience.iop.org/journal/1742-6596>

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Article

**Investigation of InAsSbP quantum dot mid-infrared sensors**

V.G. Harutyunyan, K.M. Gambaryan, V.M. Aroutiounian, I.G. Harutyunyan

Journal of Sensors and Sensor Systems 2015 249-253

*Article*

**Magnetoresistance and capacitance oscillations and hysteresis in type-II InAsSbP ellipsoidal quantum dots**

K.M. Gambaryan, V.G. Harutyunyan, V.M. Aroutiounian, Y. Ai, E. Ashalley, Z.M. Wang

Journal of Physics D: Applied Physics 2015 275302 (7pp)

<http://iopscience.iop.org/journal/0022-3727;jsessionid=38695B064D0A9864CCBDED1A...>

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*Article*

**InAsSbP Quantum Dot Mid-IR Photodetectors Operating at Room Temperature**

V.G. Harutyunyan, K.M. Gambaryan, V.M. Aroutiounian, I.G. Harutyunyan

INFRARED PHYSICS & TECHNOLOGY 2015 12-14

<http://www.journals.elsevier.com/infrared-physics-and-technology>

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*Manual*

**ԿԻՍԱՀԱՂՈՐԴԱՅԻՆ ՆԱՆՈԿԱՌՈՒՑՎԱԾՔՆԵՐԻ ԱՃԵՑՄԱՆ ՏԵԽՆՈԼՈԳԻԱԿԱՆ ՄԵԹՈԴՆԵՐԸ**

Ղամբարյան Կարեն Մարտինի

2015 59

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*Article*

**Strain-induced islands and nanostructures shape transition's chronology on InAs (100) surface**

K.M. Gambaryan, V.M. Aroutiounian, A.K. Simonyan, Y. Ai, E. Ashalley, Z.M. Wang

Advances in Nano Research 2014 211-217

<http://www.techno-press.org/?journal=anr&subpage=1>

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*Manual*

**Կիսահաղորդչային էպիտաքսիալ թաղանթների աճեցման տեխնոլոգիական մեթոդները**

Ղամբարյան Կարեն Մարտինի

2008 42

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*Conference*

**Narrow bandgap quantum dot mid-infrared photodetectors**

V.G. Harutyunyan, K.M. Gambaryan, V.M. Aroutiounian

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*Conference*

**GaNAlN material system: nanostructures growth features and immiscibility analysis**

A.K. Simonyan, K.M. Gambaryan, V.M. Aroutiounian

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*Conference*

**Aharonov-Bohm oscillations in type-II InAsSbP ellipsoidal quantum dots**

K.M. Gambaryan, V.G. Harutyunyan, V.M. Aroutiounian, L.S. Yeranyan

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*Conference*

**Nanostructures Growth Features in GaInAlN Quasiternary Material System**

K.M. Gambaryan, A.K. Simonyan

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*Conference*

**Magnetoresistance Aharonov-Bohm oscillations in type-II InAsSbP ellipsoidal quantum dots**

Ղամբարյան Կ.Մ.

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*Conference*

**Optoelectronic properties of InAsSbP quantum dot photoconductive cells**

Ղամբարյան Կարեն, Հարությունյան Վարդան, Հարությունյան Վլադիմիր

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*Conference*

**Competing nucleation of islands and nanopits in zinc-blend and wurtzite GaN-InN-AlN quaternary material system**

Ղամբարյան Կարեն, Սիմոնյան Արփիլես, Բաղդյան Երան

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*Conference*

**Narrow bandgap diode heterostructures and photoconductive cells with quantum dots for thermophotovoltaic and other mid-infrared applications**

Ղամբարյան Կ.Մ.

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*Conference*

**Growth and Characterization of InAsSbP Composition Conic Quantum Dots**

Karen M. Gambaryan

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*Conference*

**Nucleation chronology and electronic properties of In(As,Sb,P) graded-composition quantum dots**

Karen M. Gambaryan, Oliver Marquardt, Torsten Boeck, Achim Trampert

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*Patent*

**Метод выращивания полупроводниковых структур A3B5 из жидкой фазы**

Հարությունյան Կ.Մ., Գևորգյան Վ.Ա., Ղամբարյան Կ.Մ.

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*Patent*

**Метод электрожидкофазной эпитаксии**

Հարությունյան Կ.Մ., Գևորգյան Վ.Ա., Ղամբարյան Կ.Մ.

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*Patent*

**Հեղուկ ֆազից կիսահաղորդչային նանոկառուցվածքների աճեցման եղանակ**

Ղամբարյան Կարեն Մարտինի

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*Ematerial*

**Նանոէլեկտրոնային կառուցվածքների տեխնոլոգիա**

Ղամբարյան Կարեն Մարտինի

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*Conference*

**Calculation of miscibility regions for BN-Si-C ternary solid solutions**

K.M. Gambaryan, L.S. Yeranyan, A.V. Margaryan

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*Conference*

**Photoconductive Cells Based on Type-II Conical Quantum Dots for Thermo-Photovoltaic and Other Mid-Infrared Applications**

Karen Gambaryan

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*Conference*

**Emerging Horizons in TCAD**

Karen Gambaryan

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*Patent*

**Optoelectronic nanostructure, radiation conversion processes and processes for the production of asymmetric double quantum dots**

Gambaryan Karen M., Marquardt Oliver

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*Conference*

**Simulation of Electronic Properties of Volcano-Shaped Quantum Rings with Type-II Band Alignment**

L.S. Yeranyan, M.T. Sahakyan, K.M. Gambaryan

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