

# Anna Arshak Poladyan

## Faculty of Biology

Chair of Biochemistry, Microbiology, and Biotechnology

Head of the chair, associate professor

☎ 45-26

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## 🌐 Language skills

Հայերեն Русский English

## 🔬 Scientific interests

- Bioenergy, Biochemistry, Microbiology, Biotechnology

## 🏆 State awards and honorary titles

2016 Morrison Rogosa award of the American Society for Microbiology (ASM)

2019 ԵՊՀ 100-ամյակի կապակցությամբ արժաթե մեդալ

## 📖 Publications

Article

### **Gold nanoparticles activate hydrogenase synthesis and improve heterotrophic growth of *Ralstonia eutropha* H16**

Tatevik Manutsyan, Syuzanna Blbulyan, Anait Vassilian, Tatiana Semashko, Gayane Kirakosyan,

Lilit Gabrielyan, Karen Trchounian, Anna Poladyan

FEMS Microbiology Letters 2024 1-8

Article

### **Growth and hydrogen production by *Escherichia coli* during utilization of sole and mixture of sugar beet, alcohol, and beer production waste**

Kairat Bekbayev, Satenik Mirzoyan, Akerke Toleugazykyzy, Dinara Tlevlessova, Anait Vassilian,

Anna Poladyan, Karen Trchounian

Biomass Conversion and Biorefinery 2024 909-919

Article

### **Role of the *Escherichia coli* FocA and FocB formate channels in controlling proton/potassium fluxes and hydrogen production during osmotic stress in energy-limited, stationary phase fermenting cells**

Anush Babayan, Anait Vassilian, Anna Poladyan, Karen Trchounian

Biochimie 2024 91-98

Article

### **Proton conductance and regulation of proton/potassium fluxes in *Escherichia coli* FhIA-lacking cells during fermentation of mixed carbon sources**

Heghine Gevorgyan, Anna Poladyan, Karen Trchounian, Anait Vassilian  
Archives of Biochemistry and Biophysics 2024 109999

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*Article*

**Development of an H<sub>2</sub> fuel cell electrochemical system powered by Escherichia coli cells**

Torgom Seferyan, Lusine Baghdasaryan, Meri Iskandaryan, Karen Trchounian, Anna Poladyan

Electrochemistry Communications 2024 107746

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*Article*

**The antimicrobial effects of silver nanoparticles obtained through the royal jelly on the yeasts Candida guilliermondii NP-4**

Seda Marutyan, Hasmik Karapetyan, Lusine Khachatryan, Anna Muradyan, Syuzan Marutyan,

Anna Poladyan, KarenTrchounian

Scientific Reports 2024 19163

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*Article*

**L-amino acids affect the hydrogenase activity and growth of Ralstonia eutropha H16**

Meri Iskandaryan, Syuzanna Blbulyan, Mayramik Sahakyan, Anait Vassilian, Karen Trchounian,

Anna Poladyan

AMB Express 2023 33

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*Article*

**Valorization of whey-based side streams for microbial biomass, molecular hydrogen, and hydrogenase production**

Anna Poladyan, Karen Trchounian, Ela Minasyan, Meri Iskandaryan, Hayarpi Aghekyan, Sargis Aghayan,

Avetis Tsaturyan, Ani Paloyan, Garabed Antranikian, Lev Khoyetsyan

Applied Microbiology and Biotechnology 2023 4683–4696

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*Article*

**The influence of hydrogen production on the formation of metabolic pathways and regulation of ΔpH in Escherichia coli**

Heghine Gevorgyan, Anait Vassilian, Anna Poladyan, Karen Trchounian

International Journal of Hydrogen Energy 2022 40264-40274

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*Article*

**THE EFFECT OF ANTIOXIDANT ACTIVITY OF PLANTS TRIFOLIUM PRATENSE L. AND CRATAEGUS LAEVIGATA ON LIPID PEROXIDATION IN RAT'S TISSUES EXPOSED TO HYPOBARIC HYPOXIA**

I. A. BADALYAN, A. A. POLADYAN

Proceedings of the YSU B: Chemical and Biological Sciences 2022 239–244

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*Article*

**BIOMASS AND BIOHYDROGEN PRODUCTION BY ESCHERICHIA COLI UPON CONSUMPTION OF MEAT INDUSTRY AND LIGNOCELLULOSIC CORN WASTES MIXTURE**

Syuzanna Blbulyan, Satenik Mirzoyan, Karen Trchounian, Anna Poladyan

Proceedings of the YSU B: Chemical and Biological Sciences 2021 224-231

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*Article*

**Biomass and biohydrogen production during dark fermentation of Escherichia coli using office paper waste and cardboard**

Anna Poladyan, Lena Margaryan, Karen Trchounian, Armen Trchounian  
International Journal of Hydrogen Energy 2020 286-293

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*Article*

**Application of organic waste glycerol to produce crude extracts of bacterial cells and microbial hydrogenase—the anode enzymes of bio-electrochemical systems**

Anna Poladyan, Syuzanna Blbulyan, Tatiana Semashko, Volha Dziameshka, Liudmila Zhukouskaya,

Armen Trchounian

FEMS Microbiology Letters 2020 1-7

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*Article*

**ETHANOL SUPPLEMENTATION AS A NEW APPROACH TO REGULATE GROWTH AND HYDROGEN PRODUCTION OF ESCHERICHIA COLI UPON GLYCEROL FERMENTATION**

A. A. Poladyan

Proceedings of the YSU B: Chemical and Biological Sciences 2020 138-146

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*Article*

**Growth of the facultative chemolithoautotroph *Ralstonia eutropha* on organic waste materials: Growth characteristics, redox regulation and hydrogenase activity**

Anna Poladyan, Syuzanna Blbulyan, Mayramik Sahakyan, Oliver Lenz, Armen Trchounian

Microbial Cell Factories 2019 1-13

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*Article*

**Characterization of hydrogen production by *Escherichia coli* wild-type and mutants of hydrogenases utilizing xylose as fermentation substrate**

Anna Poladyan, Armen Trchounian

Bioenergy Research 2019 1033-1041

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*Article*

**Hydrogen production by *Escherichia coli* using brewery waste: optimal pretreatment of waste and role of different hydrogenases**

Anna Poladyan, Karen Trchounian, Anait Vassilian, Armen Trchounian

Renewable Energy 2018 931-936

<http://www.journals.elsevier.com/renewable-energy>

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*Article*

***Escherichia coli* wild type and hydrogenase mutant cells growth and hydrogen production upon xylose and glycerol co-fermentation in media with different buffer capacities**

Anna Poladyan, Lusine Baghdasaryan, Armen Trchounian

International Journal of Hydrogen Energy 2018 15870-15879

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*Article*

**Enhancement of *Escherichia coli* bacterial biomass and hydrogen production by some heavy metal ions and their mixtures during glycerol vs glucose fermentation at a relatively wide range of pH**

Karen Trchounian, Anna Poladyan, Armen Trchounian

International Journal of Hydrogen Energy 2017 6590-6597

<http://www.journals.elsevier.com/international-journal-of-hydrogen-energy/>

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*Article*

**Hydrogen production by Escherichia coli growing in different nutrient media with glycerol: Effects of formate, pH, production kinetics and hydrogenases involved**

Karen Trchounian, Satenik Mirzoyan, Anna Poladyan, Armen Trchounian

International Journal of Hydrogen Energy 2017 24026-24034

<http://www.journals.elsevier.com/international-journal-of-hydrogen-energy/>

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*Article*

**NEW APPROACHES TO ENHANCE HYDROGEN PRODUCTION FROM GLYCEROL BY ESCHERICHIA COLI**

A. Poladyan

Հայաստանի կենսաբանական հանդես 2017 153-159

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*Article*

**Optimizing strategy for Escherichia coli growth and hydrogen production during glycerol fermentation in batch culture: Effects of some heavy metal ions and their mixtures**

Karen Trchounian, Anna Poladyan, Armen Trchounian

Applied Energy 2016 335-340

<http://www.elsevier.com/locate/apenergy>

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*Article*

**Alkanna orientalis (L.) Boiss. plant isolated cultures and antimicrobial activity of their extracts: phenomenon, dependence on different factors and effects on some membrane-associated properties of bacteria.**

Margarit Petrosyan, Yekaterina Shcherbakova, Naira Sahakyan, Zaruhi Vardanyan, Anna Poladyan, Yuri Popov, Armen Trchounian

PLANT CELL TISSUE AND ORGAN CULTURE 2015 727-738

<http://link.springer.com/journal/11240>

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*Article*

**Escherichia coli growth and hydrogen production in batch culture upon formate alone and with glycerol co-fermentation at different pHs**

Karen Trchounian, Varduhi Abrahamyan, Anna Poladyan, Armen Trchounian

International Journal of Hydrogen Energy 2015 9935-9941

<http://www.journals.elsevier.com/international-journal-of-hydrogen-energy/>

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*Article*

**Hydrogen production by Escherichia coli during glucose fermentation: Effects of oxidative and reductive routes used by the strain lacking hydrogen oxidizing hydrogenases 1 (hya) and 2 (hyb)**

Varduhi Abrahamyan, Anna Poladyan, Anait Vassilian, Armen Trchounian

International Journal of Hydrogen Energy 2015 7459-7464

<http://www.journals.elsevier.com/international-journal-of-hydrogen-energy/>

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*Article*

**Redox stress in geobacilli from geothermal springs: Phenomenon and membrane-associated response mechanisms**

Astghik Ghazaryan, Syuzanna Blbulyan, Anna Poladyan, Armen Trchounian

Bioelectrochemistry 2015 1-6

<http://www.journals.elsevier.com/bioelectrochemistry>

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Article

**Համակարգչային տեխնոլոգիաների կիրառման առավելությունները և փորձը բուհական**

**կենսաբանության դասավանդման ընթացքում**

L.U. Գաբրիելյան, Ա.Ա. Փոլադյան, Ա.Հ. Թռչունյան

Բնագետ 2014 139-141

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Article

**Hydrogen-oxidizing hydrogenases 1 and 2 of Escherichia coli regulate the onset of hydrogen evolution and ATPase activity, respectively, during glucose fermentation at alkaline**

**evolution and ATPase activity, respectively, during glucose fermentation at alkaline**

Anna Poladyan, Karen Trchounian, Armen Trchounian, R. Gary Sawers

FEMS Microbiology Letters 2013 143-148

[http://onlinelibrary.wiley.com/journal/10.1111/\(ISSN\)1574-6968](http://onlinelibrary.wiley.com/journal/10.1111/(ISSN)1574-6968)

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Article

**Oxidative and Reductive Routes of Glycerol and Glucose Fermentation by Escherichia coli Batch Cultures and Their Regulation by Oxidizing and Reducing Reagents at Different pHs**

Anna Poladyan, Anait Vassilian, Armen Trchounian, Arev Avagyan

Current Microbiology 2013 49-55

<http://www.springer.com/life+sciences/microbiology/journal/284>

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Article

**Glycerol fermentation and molecular hydrogen production by Escherichia coli batch cultures affected by some reducing reagents and heavy metal ions**

Anna Poladyan, Karen Trchounian, Armen Trchounian, Mikayel Minasyants

NATO Science for Peace and Security Series C: Environmental Security, Black Sea Energy Resource

Development and Hydrogen Energy Problems

2013 153-163

<http://www.springer.com/us/book/9789400761513>

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Article

**Multiple and reversible hydrogenases for hydrogen production by Escherichia coli: dependence on fermentation substrate, pH and the F0F1-ATPase**

Karen Trchounian, Anna Poladyan, Anait Vassilian, Armen Trchounian

Critical Reviews in Biochemistry and Molecular Biology 2012 236-249

<http://www.tandfonline.com/toc/ibmg20/current>

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Conference

**Effect of Different Substrates on Growth and Redox Potential Kinetics of Escherichia coli Wild Type and Hydrogenases Lacking Mutant**

Anna Poladyan, Satenik Mirzoyan, Armen Trchounian

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Conference

**Glycerol Fermentation and Hydrogen Metabolism by Escherichia coli: New Approaches to Enhance Hydrogen Production**

A. Poladyan, K. Trchounian, A. Trchounian

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Conference

**Hydrogen production by Escherichia coli wild type and hydrogenase mutants upon formate and glycerol fermentation under different growth conditions**

A. Poladyan, S. Mirzoyan, K. Trchounian, A. Trchounian

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Conference

**Developing hydrogen production biotechnology: cheap substrates, effective strains and optimized fermentative conditions**

K.Trchounian, A. Poladyan, L. Gabrielyan, A. Trchounian

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Conference

**Escherichia coli growth and hydrogen production upon glycerol fermentation at slightly acidic pH: effects of formate and some heavy metal ions**

Karen Trchounian, Astghik Vardanyan, Anna Poladyan, Armen Trchounian

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Conference

**Optimization Strategy for Hydrogen Production by Escherichia coli Using Brewery Waste**

A. Poladyan, K. Trchounian, A. Trchounian

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Conference

**H<sub>2</sub> PRODUCTION BY ESCHERICHIA COLI BATCH CULTURES DURING FERMENTATION OF GLYCEROL, LACTOSE AT DIFFERENT pHs**

S. Mirzoyan, A. Poladyan, K. Trchounian, A. Trchounian

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Conference

**ESCHERICHIA COLI GROWTH AND HYDROGEN PRODUCTION USING BREWERY WASTE: OPTIMAL PRETREATMENT AND ROLE OF HYDROGENASES**

A. Poladyan, K. Trchounian, A. Trchounian

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Conference

**Glucose concentrations influence on activities of FoF<sub>1</sub> ATPase and hydrogenase 4 in Escherichia coli**

A. Poladyan, M. Sahakyan, S. Blbulyan, K. Trchounian, A. Trchounian

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Conference

**ՄԱՆՐԵՆԵՐԻ ԿԵՆՍԱՏԵԽՆՈԼՈԳԻԱՆԵՐԻ ՄԱԳԻՍՏՐՈՍԱԿԱՆ ՆՈՐ ԾՐԱԳՐԵՐԻ ԴԱՍԱԿԱՆԴՄԱՆ ՄԵԹՈԴԱԲԱՆԱԿԱՆ ՍՈՏԵՑՈՒՄՆԵՐԸ ԵՐԵՎԱՆԻ ՊԵՏԱԿԱՆ ՀԱՄԱԼՍԱՐԱՆՈՒՄ**

Թռչունյան Կ.Ա., Գաբրիելյան Լ.Ս., Փոլադյան Ա.Ա., Թռչունյան Ա.Հ.

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Conference

**Growth and Bioenergetics Properties of Facultative Chemolithoautotrophic Bacterium Ralstonia Eutropha Upon Organic Waste Materials Utilization**

S. Blbulyan, M. Sahakyan, A. Poladyan, A. Trchounian

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Conference

**Batch Fermentation Characteristics and Hydrogen Production of Escherichia coli Wild Type and Hydrogenase Mutants Using Xylose As Feedstock**

A. Poladyan, R. Hayrapetyan, A. Trchounian

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Conference

**HYDROGEN PRODUCTION BY BACTERIA: STIMULATION EFFECTS AND RESPONSIBLE HYDROGENASES DURING XYLOSE VS. GLUCOSE DARK FERMENTATION**

Anna Poladyan, Lusine Baghdasaryan, Karen Trchounian, Armen Trchounian

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Conference

**The relationship of Escherichia coli Hyd enzymes with the FOF1-ATPase during fermentation of mixture of carbon sources**

H. Gevorgyan, A. Poladyan, A. Trchounian, K. Trchounian

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*Conference*

**From organic waste to biohydrogen: Approaches to enhance H<sub>2</sub> production by Escherichia coli**

Anna Poladyan, Karen Trchounian, Armen Trchounian

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*Conference*

**Анализ использования гидрогеназ Escherichia coli в качестве анодных ферментов**

Анна Поладян, Армен Трчунян, Татьяна Семашко, Людмила Жуковская, Ольга Демешко

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*Conference*

**From organic wastes to biohydrogen: responsible hydrogenases upon different carbon mixtures utilization by Escherichia coli.**

Anna Poladyan, Karen Trchounina, Armen Trchounian

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*Conference*

**Hydrogenase Activity of the Facultative Chemolithoautotroph Ralstonia eutropha Consuming Brewery Waste**

A. Poladyan, O. Lenz, A. Trchounian

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*Conference*

**Ralstonia eutropha Hydrogenase Application in Bioelectrocatalysis as Anode Enzyme**

A. Poladyan, T. Semashko, L. Zhukouskaya, V. Dziameshka, A. Trchounian

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*Conference*

**Analysis of the Escherichia coli hydrogenases as anodic enzymes in bioelectrochemical system**

Anna Poladyan, Tatyana Semashko, Lyudmila Zhukouskaya, Volha Diameshka, Armen Trchounian

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*Conference*

**Upcycling of office waste paper and cardboard to biohydrogen**

Anna Poladyan, Lena Margaryan, Karen Trchounian, Tatyana Semashko, Armen Trchounian

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*Conference*

**Redox regulation of the growth, hydrogenase activity and bioenergetic properties of Ralstonia eutropha upon different carbon source utilization**

S. Blbulyan, M. Sahakyan, A. Poladyan, A. Trchounian

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*Conference*

**Lignocellulosic waste as feedstock for bacterial biomass production: enhanced hydrogen evolution and hydrogenase activity**

Anna Poladyan, Syuzanna Blbulyan, Mayramik Sahakyan, Armen Trchounian

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*Conference*

**H<sub>2</sub> - Oxidizing Activity of Escherichia coli Upon Utilization of Different Waste Components**

A. Poladyan, L. Baghdasaryan, S. Blbulyan, A. Trchounian

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Conference

**Ethanol Affected Bacterial Growth and molecular Hydrogen Production by Escherichia coli Upon Fermentation of Glycerol**

S.Blbulyan, A. Poladyan, A. Trchounian

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Conference

**Prospective Trends in Biotechnology for Biohydrogen**

Karen Trchounian, Anna Poladyan, Lilit Gabrielyan, Armen Trchounian

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Conference

**The role of formate neutralization and molecular hydrogen generation in the metabolic flux in Escherichia coli during fermentation of mixed carbon sources**

Gevorgyan H., Poladyan A., Trchounian K.

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Conference

**Biohydrogen Production from Roasted Coffee Waste: Understanding the Role of E. coli Hydrogenases During Fermentation**

S. Mirzoyan, L. Vanyan, H. Aghekyan, A. Poladyan, K. Trchounian

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Conference

**Optimization of Fruits Waste Pretreatment for E. coli Growth and H<sub>2</sub> Production**

S. Mirzoyan, A. Vassilian, A. Poladyan, K. Trchounian

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Conference

**Biomass and biohydrogen production by Escherichia coli upon consumption of meat and lignocellulosic waste mixture**

Syuzanna Blbulyan, Anna Poladyan, Satenik Mirzoyan, Liana Mnatsakanyan, Karen Trchounian

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Conference

**WINE GRAPE WASTE APPLICATION FOR ESCHERICHIA COLI BIOMASS AND H<sub>2</sub> PRODUCTION**

Syuzanna Blbulyan, Lusine Baghdasaryan, Satenik Mirzoyan, Anahit Vassilian, Tatiana Semashko,

Anna Poladyan

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Conference

**The valorization of whey-based side-streams for microbial biomass, hydrogen and hydrogenase enzyme production**

Anna Poladyan, Hayarpi Aghekyan, Ella Minasyan, Karen Trchounian, Ani Paloyan, Sargis Aghayan,

Garabed Antranikian, Meri Iskandaryan, Diana Ghevondyan

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Conference

**ՕՐԳԱՆԱԿԱՆ ԹԱՓՈՆՆԵՐԻՑ ԿԵՆՍԱԶԱՆԳՎԱԾԻ ԵՎ ԿԵՆՍԱԵՆԵՐԳԻԱՅԻ ՓՈԽԱԿԵՐՊՄԱՆ**

**ԿԵՆՍԱԹԻՄԻԱԿԱՆ ՈՐԴԻՆԵՐԻ ԲՆՈՒԹԱԳՐՈՒՄԸ ԵՎ ՕՔՍԻԴԱԿԵՐԱԿԱՆԳՈՂԱԿԱՆ ԿԱՐԳԱՎՈՐՈՒՄԸ**

Փոլյարյան Ա.Ա., Գևորգյան Հ.Խ., Վանյան Լ.Մ., Բաբայան Ա.Ռ., Բաղդասարյան Լ.Հ., Վասիլյան Ա.Վ.,

Պետրոսյան Հ.Հ.

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Conference

**THE OXIDATIVE STRESS AND POSSIBLE PREVENTIVE ACTION OF PLANT BORN POLYPHENOLS**

Anahit Shirvanyan, Anush Babayan, Alvard Minasyan, Margarit Petrosyan, Anna Poladyan,

Naira Sahakyan

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Conference

**THE OXIDATIVE STRESS AND T2DM-INDUCED DIABETIC NEPHROPATHY: POSSIBLE PREVENTIVE ACTION OF PANT-BORN OLIGOMERIC POLYPHENOLS**

Gohar Sahakyan, Anne Vejux, Margarit Petrosyan, Anna Poladyan, Naira Sahakyan

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Conference

**Characteristic effects of gold nanoparticles on growth and H<sub>2</sub> metabolism of *Ralstonia eutropha* H16 and *Escherichia coli***

Anna Poladyan, Tatev Manutsyan, Meri Iskandaryan, Syuzanna Blbulyan, Anait Vassilian,

Tatiana Semashko

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Conference

**The role of glycine-betaine in the hydrogen metabolism of *Ralstonia eutropha* H16**

Meri Iskandaryan, Liana Mnatsakanyan, Anna Poladyan

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Conference

**Fe ions effect on hydrogenase activity of *Ralstonia eutropha* H16 in various growth media**

Sona Nikolyan, Armine Margaryan, Anna Poladyan

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Conference

**A NOVEL COST-EFFECTIVE APPROACH FOR PRODUCTION OF HYDROGENASE ENZYMES AND MOLECULAR HYDROGEN FROM WHEY-BASED BY-PRODUCTS**

Anna Poladyan, Meri Iskandaryan, Ofelya Karapetyan, Ela Minasyan, Anait Vassilian, Karen Trchounian,

Garabed Antranikian

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Conference

**REDOX REGULATION OF HYDROGEN PRODUCTION IN *ESCHERICHIA COLI* DURING GROWTH ON BYPRODUCTS OF THE WINE INDUSTRY**

Lusine Baghdasaryan, Karen Trchounian, Garabed Antranikian, Anna Poladyan, Ofelya Karapetyan

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Conference

**BIOTECHNOLOGICAL POTENTIAL OF SPENT COFFEE GROUNDS FOR LARGE-SCALE HYDROGEN PRODUCTION**

Liana Vanyan, Anait Vassilian, Anna Poladyan, Karen Trchounian

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Conference

**Influence of acidic pH on the interaction between proton ATPase and enzymes responsible for molecular hydrogen generation**

Karen Trchounian, Heghine Gevorgyan, Lilit Baghdasaryan, Anait Vassilian, Anna Poladyan

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Conference

**Formate-hydrogen lyase has a significant role in proton motive force generation in *Escherichia coli* at acidic pH during mixed carbon fermentation**

Heghine Gevorgyan, Anait Vassilian, Anna Poladyan, Karen Trchounian

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Conference

**The impact of oxygen-tolerant hydrogenases on cell energetics of *Cupriavidus necator* H16**

Meri Iskandaryan, Anna Poladyan

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*Conference*

**Understanding the Role of Escherichia coli Hydrogenase-2 subunits in proton flux under different glucose concentrations**

Liana Vanyan, Anait Vassilian, Anna Poladyan, Karen Trchounian

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*Conference*

**Bioenergetic Properties of Microbes as Potential Target for Antibacterial Activity of Plant-Based Compounds**

Anna Poladyan, Karen Trchounian, Naira Sahakyan

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*Conference*

**Cupriavidus necator H16 growth and H<sub>2</sub>-oxidizing Activity Using Mixture of Glycerol and Roasted Coffee Waste**

R. Avetisyan, L. Mnatsakanyan, K. Trchounian, A. Poladyan

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*Conference*

**Evaluation of an H<sub>2</sub> fuel cell electrochemical system powered by microbial cells**

M. Iskandaryan, A. Poladyan, L. Baghdasaryan, T. Seferyan

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*Conference*

**Effect of glycine on the heterotrophic growth and [NiFe]-hydrogenase activity of Cupriavidus necator H16**

M. Iskandaryan, J. Schoknecht, O. Lenz, A. Poladyan

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