SOCIETY FOR SCIENCE & THE PUBLIC
Inform. Educate. Inspire.

# Intel ISEF 2013 Grand Awards Ceremony
May 17, 2013
Phoenix, Arizona

Society for Science & the Public, in partnership with the Intel Foundation, announced Grand Awards of the Intel ISEF 2013. Student winners are ninth through twelfth graders who earned the right to compete at the Intel ISEF 2013 by winning a top prize at a local, regional, state or national science fair.

## The Gordon E. Moore Award

**The Gordon E. Moore Award recognizes the Best of the Best among the outstanding students from around the world who participate in the Intel ISEF. The finalist with the winning project is selected on the basis of outstanding and innovative research, as well as on the potential impact of the work in the field and on the world at large.**

**Gordon E. Moore Award $75,000**

CS054 **Using Artificial Intelligence to Create a Low Cost Self-driving Car**
Ionut Alexandru Budisteanu, 19, Liceul Tehnologic Oltchim, Ramnicu Valcea, Romania

## Intel Foundation Young Scientist Award

**These finalists were selected for their commitment to innovation in tackling challenging scientific questions, using authentic research practices, and creating solutions to the problems of tomorrow.**

**Young Scientist Award of $50,000**

CH051 **Design and Synthesis of Hydrogenated $TiO_2$-Polyaniline Nanorods for Flexible High-Performance Supercapacitors**
Eesha Khare, 18, Lynbrook High School, San Jose, California

PH011 **Cool Core Bias in Sunyaev-Zel'dovich Galaxy Cluster Surveys**
Henry Wanjune Lin, 17, Caddo Parish Magnet High School, Shreveport, Louisiana

**The award is disbursed in four equal installments to students enrolled at any accredited degree-granting institution of higher education, following their successful completion of high school. Students must provide proof of registration and good academic standing from the school's registrar each semester.**

## Dudley R. Herschbach SIYSS Award

All-expense-paid trip awarded to three finalists to attend the Stockholm International Youth Science Seminar (SIYSS) (www.fuf.org/siyss/), which includes attendance at the Nobel Prize ceremonies, in Stockholm, Sweden. The Dudley R. Herschbach SIYSS Award is a multi-disciplinary seminar highlighting some of the most remarkable achievements by young scientists from around the world. The students have the opportunity to visit scientific institutes, attend the Nobel lectures and press conferences, learn more about Sweden and experience the extravagance of the Nobel festivities. Valid passport required for travel.

BI011 **Analysis of Fel d 1 Allergen Transcripts in *Felis catus* Saliva using Reverse Transcription Quantitative Polymerase Chain Reaction (RT-qPCR)**
Savannah Joy Tobin, 18, West Salem High School, Salem, Oregon

CB017 **Discovering a Metabolic Weakness in Melanoma through Targeted Gene Inhibition**
Hannah Constance Wastyk, 17, Palmyra Area High School, Palmyra, Pennsylvania

MI039 **Site-directed Mutagenesis of the Metal-reducing Bacterium S. oneidensis MR-1: A Novel Strategy for Genetic Engineering in Recalcitrant Microorganisms**
David Masao Zimmerman, 18, Brentwood School, Los Angeles, California

The SIYSS will be held in Stockholm, Sweden in December. Winning projects were chosen from the natural sciences categories (biology, chemistry, environmental sciences, and medicine). Students must have a valid passport and be 18 years old prior to the Nobel ceremony in December to be considered. The history of SIYSS began as early as 1976 when the first seminar was organized by the Swedish Federation of Young Scientists together with the Nobel Foundation, with inspiration from Society for Science & the Public. This award is named for Dudley R. Herschbach, Harvard Professor and 1986 Nobel Laureate in chemistry. He is Emeritus Board Chair of Society for Science & the Public.

# Innovation Exploration Award

From the first rocket research in 1936 to the first US satellite in 1958 to the many missions to learn about Venus, Neptune, Jupiter and most recently the Mars Curiosity Lander in 2012, the Jet Propulsion Laboratory, California Institute of Technology is a place where science, technology and engineering intermix to produce iconic robotic space explorers sent to every corner of the solar system helping us to discover how the universe, the solar system, and life formed and evolved. JPL was established by the California Institute of Technology (Caltech) in 1944, a prestigious university whose mission is to expand human knowledge and benefit society through research integrated with education.

For the first time at Intel ISEF, in collaboration with Intel Corporation, a number of students will have the opportunity to be a part of a behind the scenes visit to the Jet Propulsion Laboratory in Pasadena, California, and also visit the world renowned Caltech, meet with scientists, present their own work, and see what is next in space exploration. Trip dates are in June 2013.

Innovation Exploration Award

EM040 **Use of Co-Solvents to Enhance Astaxanthin Extraction from *L. setiferus* Shells with Vegetable Oils**
Shixuan Justin Li, 15, Rutherford High School, Panama City, Florida

EN049 **Advances in the Bottom-Up Assembly of Multicellular Architectures: From Neuroengineering to Biodefense**
Samantha Marie Marquez, 17, Maggie L. Walker Governor's School, Richmond, Virginia

ET032 **Algae to Oil via Photoautotrophic Cultivation and Osmotic Sonication**
Evie Sobczak, 16, Shorecrest Preparatory School, St. Petersburg, Florida

# London International Youth Science Forum - The Philip V. Streich Memorial Award

The London International Youth Science Forum is a two-week program held annually for 300 young scientists from more than 50 countries. LIYSF offers a unique opportunity to participate in an international event attracting science students from around the world. Philip V. Streich was an alumnus of the Intel International Science and Engineering Fair in 2007, earning an Intel Foundation Young Scientist Award, and in 2008. He was selected as a finalist, and earned third place at the Intel Science Talent Search 2009, both programs of the Society for Science & the Public.

Participation in the two week London International Youth Science Forum July 24- August 7, 2013.

PS307 **The Characterization of the LPS-Induced Hypersensitive Response in *Ceratopteris richardii***
Ryan M. Kenny, 16, George W. Hewlett High School, Hewlett, New York
Samantha Hayley DiSalvo, 16, George W. Hewlett High School, Hewlett, New York
Amy Jaclyn Vitha, 16, George W. Hewlett High School, Hewlett, New York

This two-week summer experience that gathers high-achieving students from around the world embodies Philip's spirit of social gathering around the sciences.

# MIT Lincoln Laboratory

Lincoln Lab has partnered with SSP and the Intel ISEF to promote science education through the Ceres Connection. The names of first and second place category award winners at Intel ISEF will be submitted to the International Astronomical Union (IAU) for naming of a minor planet. All minor planets in the Ceres Connection have been discovered by the Lincoln Near Earth Asteroid Research (LINEAR) program, operated by MIT's Lincoln Laboratory.

# European Union Contest for Young Scientists

An all-expense paid trip enables attendance at the European Union Contest for Young Scientists located in a new city each year.

Trip to the EU Contest.

EE064 **A Novel Modular Repulsive Type Hybrid Magnetic Bearing for FES Systems**
Zeyu Liu, 17, Sir Winston Churchill High School, Calgary, Canada

MA011 **Efficient Characteristic 3 Galois Field Operations for Elliptic Curve Cryptographic Applications**
Vinay Sridhar Iyengar, 17, Oregon Episcopal School, Portland, Oregon

The EU Contest for Young Scientists was developed to promote the ideals of co-operation and interchange between young scientists. The Contest is the annual showcase of the best of European student scientific achievement. The program this year is in Prague, Czech Republic, September 20-25, 2013. Valid passport required.

# Animal Sciences

Intel will present Best of Category Winners with a $5,000 award. Additionally, a $1,000 grant will be given to their school and the Intel ISEF affiliated fair they represent.

Intel ISEF Best of Category Award of $5,000

AS057 **Toward Understanding the Neural Circuitry Regulating Cold Sensitivity in *C. elegans***

Michael Shao, 16, Detroit Country Day Upper School, Beverly Hills, Michigan

**First Award of $3,000**

AS005 **Daphnia Development: A Comparative Temperature and Phosphorus Tolerance Experiment Using Resurrection Ecology of *Daphnia pulex***
Nicole Marie Biddinger, 17, Bartlesville High School, Bartlesville, Oklahoma

AS057 **Toward Understanding the Neural Circuitry Regulating Cold Sensitivity in *C. elegans***
Michael Shao, 16, Detroit Country Day Upper School, Beverly Hills, Michigan

**Second Award of $1,500**

AS013 **The Chemical Ecology of the Diaprepes Root Weevil: Olfactory Responses to Conspecific and Plant Odors**
Evan Cliff MacKay, 16, Vero Beach High School, Vero Beach, Florida

AS018 **A Study of Transposition Events of the Gypsy Retrotransposon in the Neural Cells of *Drosophila melanogaster* and Its Relation to Neuronal Decline**
Trinity Russell, 17, Commack High School, Commack, New York

AS029 **Olfactory Discrimination Between Regular and Deuterated Compounds in European Honeybees (*Apis mellifera*)**
Eric Samuel Epstein, 17, Tucson High Magnet School, Tucson, Arizona

AS038 **Effects of Environmental Stressors on the Filtration Rates of the Blue Mussel *Mytilus edulis***
Meagan Elizabeth Currie, 16, Greely High School, Cumberland, Maine

**Third Award of $1,000**

AS007 **The Bisphenol Blowfly Blitz: An Assessment of the Plastic Monomer Bisphenol-A on the Metamorphic Activity of *Sarcophaga bullata*-A Forensics Study**
Andrew Clark Hopkins, 17, Phillip O. Berry High School, Charlotte, North Carolina

AS016 **A Comparative Study of Different Strains of *Gallus domesticus***
Chrysta Noelle Beck, 17, Pettisville High School, Pettisville, Ohio

AS023 **The Effect of Turmeric on the Memory Curves of Planarians**
Supraja Shivakumar Chittari, 17, George C. Marshall High School, Falls Church, Virginia

AS025 **Cryoprotection: A 4 Year Study**
Kyle Davis Ramsey, 15, Navasota High School, Navasota, Texas

AS039 **Avian Mimicry in Color Space**
Uri Rosenshine, 17, The Bronx High School of Science, Bronx, New York

AS040 **InSPECT: Identifying Memory Encoding Neurons through Spectral Analysis**

Amanpreet Singh Kandola, 17, Stuyvesant High School, New York, New York

**Fourth Award of $500**

AS004 **Response of Soil Invertebrates to Electromagnetic Stimuli**
Teva Paul Ilan, 17, Howard High School, Macon, Georgia

AS026 **Optimal Equine Balance: Application of Biophysics to Assess and Reduce Equine Injury**
Erika Nicole Mueller, 15, Clearfield High School, Clearfield, Utah

AS027 **Lepidopteran Spiracle Variation**
Alina Isabella Suedbeck, 17, Green Acres Academy, Greenville, North Carolina

AS034 **Developing a PCR Technique to Determine the Distribution of Lyme Disease in Johnson County, Kansas**
Nathan Alan Witters, 17, Shawnee Mission West High School, Overland Park, Kansas

AS042 **Influence of the Number of Estrous Cycles of Heifers Before Exposure to Breeding on Pregnancy Rate and Breed Back Rate in *Bos taurus***
Jaclyn Nicole Ketchum, 16, Carter County High School, Ekalaka, Montana

AS050 **A Novel Study on the "Safer Substitute:" Evaluating the Behavioral and Developmental Effects of BPA and BPS on the *C. elegans* Model**
Bansri Manesh Patel, 16, Sussex Technical High School, Georgetown, Delaware

AS051 **Evolutionary Effects on the Demographic Parameters of Fall Army Worm, *Spodoptera frugiperda* (Lepidoptera: *Noctuidae*) on Artificial Diet Compared with Traditional and Transgenic Corn**
Manuela Jojoa-Portilla, 16, Cleveland High School, Cleveland, Mississippi

AS306 **Research Analysis on the Features of Families of Korean Butterflies Based on Their Veins**
Soo Kyeong Ju, 17, Dongducheon High School, Dongducheon-si, South Korea
Su-min Bang, 18, Dongducheon High School, Dongducheon-si, South Korea

# Behavioral and Social Sciences

**Intel will present Best of Category Winners with a $5,000 award. Additionally, a $1,000 grant will be given to their school and the Intel ISEF affiliated fair they represent.**

**Intel ISEF Best of Category Award of $5,000**

BE019 **The At-Risk Maturing Brain: Effects of Stress Paradigms on Mood, Memory and Cognition in Adolescents and the Role of the Prefrontal Cortex**
Zarin Ibnat Rahman, 16, Brookings High School, Brookings, South Dakota

**First Award of $3,000**

BE019 **The At-Risk Maturing Brain: Effects of Stress Paradigms on Mood, Memory and Cognition in Adolescents and the Role of the Prefrontal Cortex**
Zarin Ibnat Rahman, 16, Brookings High School, Brookings, South Dakota

BE050 **The Effect of Emoticon Stimuli on Human Facial Muscle Activation and Social Evaluation Using Electromyographic Technology: A Novel Determination**
Abigail Claire Orlando, 18, Eastchester High School, Eastchester, New York

**Second Award of $1,500**

BE006 **The Effects of a Multi-Factor Hand Hygiene Intervention with Motivational Interviewing on Hand Washing Effectiveness, Behavior, Attitudes, and Absences of High School Students**
Timothy James Fossum Renier, 15, East High School, Duluth, Minnesota

BE023 **My Project Is Fantastic! Gender Differences in Self-Promotion and Their Effects on Perceptions of a College Essay**
Arshia Aalami Harandi, 17, Roslyn High School, Roslyn Heights, New York

BE036 **HuD as a Variant-Specific Regulator of Neuronal Differentiation in the Adult Hippocampus: Implications in Alzheimer's Dementia**
Miguel Ignacio Paredes, 18, American Heritage School, Plantation, Florida

BE049 **Digitizing Manipulatives with Radio Frequency Identification (RFID) for the Blind and Visually Impaired Users**
Sara Manshad, 14, Arrowhead Park Early College High School, Las Cruces, New Mexico

**Third Award of $1,000**

BE026 **Physical Education at School: Pedagogical Solutions to the Main Difficulties Found by Brazilian Secondary School Teachers**
Tulio Vinicius Andrade Souza, 17, Grupo Genese de Ensino, Recife, Brasil

BE040 **Neural Correlates of Visual Awareness during Perceptual Organization**
Danila Alferov, 15, A.B. Lucas Secondary School, London, Canada

BE041 **Neural Plasticity: Novel Language Learning through Digital Technology**
Adelina Corina Cozma, 17, Bayview Secondary School, Richmond Hill, Canada

BE042 **Improving Long-term Compliance to Life Saving Medications**
Avinash Kumar Pandey, 15, Waterloo Collegiate Institute, Waterloo, Canada

BE301 **The Square Based Paradigm: A Newly Invented Method for Faster Spelling with Brain Waves (Year III)**
Ryan Matthew Shih, 17, Stanton College Preparatory School, Jacksonville, Florida
Kevin Daniel Shih, 17, Stanton College Preparatory School, Jacksonville, Florida

**Fourth Award of $500**

BE003 **Applying Matrix Theory to Model Global Social Dynamics**
Heeyoon Kim, 18, Rockdale Magnet School for Science and Technology, Conyers, Georgia

BE009 **Students' Life Satisfaction between Chinese-Immigrants and Their Counterparts**

Jessica Jiamei Lee, 14, Eastside High School, Gainesville, Florida

BE013 **Polar Bears, Penguins, and Cognitive Processing. . . Oh My!, Year Three**
Caitlyn Mary Ralph, 16, Lake Howell High School, Winter Park, Florida

BE014 **The Effects of the Media on Gender Stereotypes and the Furthering of Sexual Harassment**
Petra Katherine Ronald, 17, Paul Laurence Dunbar High School, Lexington, Kentucky

BE015 **Developing an Android Tablet Application for the Diagnosis of Alzheimer's Disease**
Nazia Ejaz Ahmed, 15, Williams High School, Plano, Texas

BE031 **Motivational Interviewing as a Form of Stress Relief in Adolescents**
Allison Michelle Kath, 17, Tucson High Magnet School, Tucson, Arizona

BE310 **Birth of a Revolution: A Global Model for Forecasting Political Instability**
Abhishek Nayar, 16, Edina High School, Edina, Minnesota
Stephen Hanjun Kim, 18, Edina High School, Edina, Minnesota

# Biochemistry

**Intel will present Best of Category Winners with a $5,000 award. Additionally, a $1,000 grant will be given to their school and the Intel ISEF affiliated fair they represent.**

**Intel ISEF Best of Category Award of $5,000**

BI011 **Analysis of Fel d 1 Allergen Transcripts in *Felis catus* Saliva using Reverse Transcription Quantitative Polymerase Chain Reaction (RT-qPCR)**
Savannah Joy Tobin, 18, West Salem High School, Salem, Oregon

**First Award of $3,000**

BI011 **Analysis of Fel d 1 Allergen Transcripts in *Felis catus* Saliva using Reverse Transcription Quantitative Polymerase Chain Reaction (RT-qPCR)**
Savannah Joy Tobin, 18, West Salem High School, Salem, Oregon

BI057 **Interferon-alpha 2b: Targeting the STAT1 Pathway and Minimizing Breast Cancer and Leukemia Cell Proliferation**
Andrea Shao-yin Li, 16, Thomas Jefferson High School for Science and Technology, Alexandria, Virginia

**Second Award of $1,500**

BI020 **Targeting Lung Mutagenesis: Mycosporine-like Amino Acids as Scavengers of PAH o-Quinone Derived ROS for the Reduction of p53 Strand Scission and Mutation in Human Lung Cancer**
Ailis Clare Dooner, 16, Carmel High School, Carmel, California

BI035 **Rationally Designed Beta-Catenin Inhibitors as Anti-Tumor Agents**
Samuel Wye Pritt, 18, Home School, Walkersville, Maryland

BI036 **Tracing the Mistakes of Nature: Model Study for the Development of a Strategy to Prohibit Beta-Amyloid Aggregation**

Yarim Lee, 15, Townsend Harris High School, Flushing, New York

BI042 **Targeting Survivin as a Potential Cancer Therapeutic**
Kelsey Mackenzie Barter, 17, University High School, Tucson, Arizona

**Third Award of $1,000**

BI017 **Inhibition of the FabI Enoyl-ACP Reductase from *Burkholderia pseudomallei***
Minah Kim, 17, Paul D. Schreiber High School, Port Washington, New York

BI305 **A Novel Approach to Attenuate Asthma Drug Albuterol's Side Effects: A Study Using Zebrafish Model**
Ayush Kumar, 16, Advanced Math and Science Academy Charter School, Marlboro, Massachusetts
Raashed Raziuddin, 15, Advanced Math and Science Academy Charter School, Marlborough, Massachusetts

BI306 **MiR17-92 Cluster in Axons Promotes Axonal Outgrowth**
Guangning An, 16, International Academy, Troy, Michigan
Yu Tang, 17, International Academy, Troy, Michigan

BI307 **Prototype Testing Tool to Distinguish Between Artificially and Naturally Ripened Fruits**
Khanak Bhargava, 15, Amity International School, Mayur Vihar, New Delhi, India
Ishani Goomer, 16, Amity International School,Mayur Vihar, New Delhi, India

BI310 **The Effects of Applying a Novel Silica Nanoparticle Compound Medication to Effectively Eradicate Malaria**
Hassan Nezar Khdary, 16, Manarat Al-Riyadh School, Riyadh, Saudi Arabia
Khaled Manahi Alkozman, 17, Manarat Al-Riyadh School, Riyadh, Saudi Arabia

BI311 **Roles of Semaphorin7A and Cadherin8 in Synaptic Guidance Influencing Autism Spectrum Disorders**
Sania Khalid, 18, Ossining High School, Ossining, New York
Amrita Ramesh, 18, Ossining High School, Ossining, New York

**Fourth Award of $500**

BI010 **Immobilization of Enzymes via Concentric Nafion/Cellulase Electrospun Fibers for Bioethanol Production**
Alicia Danielle D'Souza, 15, Clark High School, Plano, Texas

BI013 **Mining Active Natural Products and Potential Medicinal Plants by Using Molecular Positioning System**
Yuxi Jiang, 17, No.2 High School Attached to East China Normal University, Shanghai, China

BI025 **A Novel Function of TsTXK-beta Neurotoxin in the *Tityus serrulatus* Scorpion Venom**
Nayrob Pereira, 17, Escola Estadual Alberto Torres, Sao Paulo, Brasil

BI044 **Intranasal Administration of Neuropeptide-Y Influences Development of PTSD-like Symptoms**
Sheida Takmil, 17, Ossining High School, Ossining, New York

BI046 **Tributyltin Disrupts Adipocyte Metabolism**
Emily Taylor Hayes, 18, Walter Payton College Preparatory High School, Chicago, Illinois

BI048 **CancAARS: A Novel Therapeutic Target for Melanoma Tumorigenesis**
Robert Mohamed Bacchus, Jr., 16, Lincoln Park Academy, Fort Pierce, Florida

BI059 **Elucidating the Biochemical Mechanisms of Synthesis of Anthocyanins in Citrus Fruits**
Saumya Ramadugu Keremane, 15, Martin Luther King High School, Riverside, California

BI312 **The Effect of Growth Factors on the Proliferation of Beta Cells**
Jacob Michael Cabrejas, 17, Hamilton High School, Chandler, Arizona
Paula Nicole Beatty, 16, Hamilton High School, Chandler, Arizona

# Cellular and Molecular Biology

**Intel will present Best of Category Winners with a $5,000 award. Additionally, a $1,000 grant will be given to their school and the Intel ISEF affiliated fair they represent.**

**Intel ISEF Best of Category Award of $5,000**

CB017 **Discovering a Metabolic Weakness in Melanoma through Targeted Gene Inhibition**
Hannah Constance Wastyk, 17, Palmyra Area High School, Palmyra, Pennsylvania

**First Award of $3,000**

CB017 **Discovering a Metabolic Weakness in Melanoma through Targeted Gene Inhibition**
Hannah Constance Wastyk, 17, Palmyra Area High School, Palmyra, Pennsylvania

CB053 **A Potential Treatment for Cirrhosis: Retinol-Palmitic Acid Treatments and Knockdown of the miR-23b Cluster Reverts Cirrhotic Hepatic Stellate Cells to the Quiescent State**
Daniel Jeremy Fulop, 17, John Jay High School, Cross River, New York

**Second Award of $1,500**

CB004 **Turning Off the Transporter SLC35F2**
Yasmine Sapphire Zubi, 17, Satellite High School, Satellite Beach, Florida

CB031 **miRNA and Cancer, Phase II: Constructing a Bidirectional Cassette to Identify miRNA Regulators**
Lawrence Zhang, 17, Fairview High School, Boulder, Colorado

CB033 **An Empirical Method for Haplotype Phasing Using Nanodroplets in Digital Emulsion PCR**
Catherine Wong, 17, Morristown High School, Morristown, New Jersey

CB064 **The Effect of GYY4137 on the Differentiation of Dental Pulp Stem Cells into Hepatic Cells**
Manotri Chaubal, 16, Thomas Jefferson High School for Science and Technology, Alexandria, Virginia

**Third Award of $1,000**

CB018 **Enhancing Maturation of Human Induced Pluripotent Stem Cell-Derived Cardiomyocytes by Triiodothyronine Treatment and Nanopatterned Substrates**
Isaac Stephen Harper, 14, Cedarcrest High School, Duvall, Washington

CB022 **Depletion of Circulatory ST6Gal-1 Alters B-Cell Development**
Yankang Yang, 17, City Honors School, Buffalo, New York

CB045 **The Identification of Pathways that Govern Heart Development in the 22q11.2 Deletion Syndrome**
Aminah Abrar Sallam, 18, Stuyvesant High School, New York, New York

CB050 **Discovering and Defining the Role of Cilia in Dermal Stem Cell Communication**
Sarthak Sinha, 17, Henry Wise Wood High School, Calgary, Canada

CB062 **Altered microRNA Expression in Colon Cancer Progression**
Pooja N. Prasad, 16, Bellaire High School, Bellaire, Texas

CB308 **Hedgehog-Gli Signaling Promotes Cell Proliferation and Epithelial-to-Mesenchymal Transition in Lung Cancer**
Joy Qiu Jin, 15, Henry M. Gunn High School, Palo Alto, California
Thomas Michael Luh, 17, Leland High School, San Jose, California

**Fourth Award of $500**

CB013 **Purification of Mycobacterium Tuberculosis Antigen and Antibody by Affinity Chromatography**
Nafisa Wara, 15, Boston Latin School, Boston, Massachusetts

CB021 **Hyperglycemia and HIV: A Correlation—Hyperglycemia Increases HIV Entry in T Cells via ROS Generation**
Aakash Viren Jhaveri, 16, The Wheatley School, Old Westbury, New York

CB026 **Investigating MicroRNA-mediated Regulation of Class Specific Dendrite Morphogenesis**
Suhas Gondi, 17, Thomas Jefferson High School for Science and Technology, Alexandria, Virginia

CB042 **Analysis of Critical PKC-delta Sites on Sarcomeric Protein Phosphorylation and Function**
Srisha R. Kotlo, 16, Illinois Mathematics and Science Academy, Aurora, Illinois

CB044 **Effects of NF-kappa B Activation on E6 Expression in Head and Neck Cancer Cells**
Shelly Vivian Li, 18, Illinois Mathematics and Science Academy, Aurora, Illinois

CB063 **The Use of Antioxidants to Combat *in vitro* Lipid Peroxidation of *Saccharomyces cerevisiae***
Iman Mahoui, 15, Eman Schools, Fishers, Indiana

CB303 **A Study of the Role of the ROCK Kinase Pathway in Dental Pulp Stem Cell Differentiation and Mineralization**
Aneri Kinariwalla, 17, Sayville High School, West Sayville, New York
Evan Samuel Chernack, 18, South Side High School, Rockville Centre, New York

CB305 **The Effect of Ethanol on Beta Cell Development in Zebrafish**
Emory Morris Payne, 17, Bancroft School, Worcester, Massachusetts
Zohaib Majaz Moonis, 17, Bancroft School, Worcester, Massachusetts

# Chemistry

**Intel will present Best of Category Winners with a $5,000 award. Additionally, a $1,000 grant will be given to their school and the Intel ISEF affiliated fair they represent.**

**Intel ISEF Best of Category Award of $5,000**

CH051 **Design and Synthesis of Hydrogenated TiO2-Polyaniline Nanorods for Flexible High-Performance Supercapacitors**
Eesha Khare, 18, Lynbrook High School, San Jose, California

**First Award of $3,000**

CH042 **The Effects of Operating Conditions on Gas Transport Mechanisms through SAPO-34 Zeolite Membranes**
Michael Zhu Chen, 16, Fairview High School, Boulder, Colorado

CH051 **Design and Synthesis of Hydrogenated TiO2-Polyaniline Nanorods for Flexible High-Performance Supercapacitors**
Eesha Khare, 18, Lynbrook High School, San Jose, California

**Second Award of $1,500**

CH009 **Procedures for Separation of Volatile Oils**
Michael Laue, 17, Europagymnasium Walther Rathenau Bitterfeld, Bitterfeld, Germany

CH032 **Nanostructured $Co_3O_4$, CoO and CoN as High Capacity and Long Life Anodes for Li-ion Batteries**
Prithvi Gundlapalli, 17, Saint Andrew's Junior College, Singapore

CH063 **Efficient and Recyclable Cellulose-Supported Pd-Nanocatalysts for Suzuki Coupling Reactions**
Claudia Huang, 16, Carmel High School, Carmel, Indiana

CH308 **Studies on the Boekelheide Rearrangement of Cyclic Nitronates**
Ekaterina Kutsenok, 16, Moscow Chemical Lyceum No. 1303, Moscow, Russia
Maxim Ruslanovich Radzhabov, 15, Moscow Chemical Lyceum No. 1303, Moscow, Russia

**Third Award of $1,000**

CH001 **Luminescence Improvement of Lanthanide Complexes**
Michaela Krakorova, 18, Gymnasium Brno-Reckovice, Brno, Czech Republic

CH024 **Towards Next-Generation Nanomaterials: Atomistic, First-Principles Analysis of N-Doped Reduced Graphene Oxide**
Shyamal Buch, 17, Vista del Lago High School, Folsom, California

CH030 **Preparation of Surfactants Mixture from Cashew Nut Shell Liquid and Castor Oil to Combat the Dengue Mosquito Larvae**
Gabriel Tiago Galdino, 17, Escola Estadual Jose Maria Hugo Rodrigues, Campo Grande, Brasil

CH034 **Design and Synthesis of Novel Tetraphenylporphyrin-based Metal-Organic Frameworks for Photodynamic Therapy and Drug Delivery**
Landon Yates Carter, 16, North Carolina School of Science and Mathematics, Durham, North Carolina

CH043 **Adaptations to the Common Car Battery: Concentration Cell and Alloyed Electrode Manipulation**
Mikala Paula Cohen, 17, Cypress Bay High School, Weston, Florida

CH305 **Organic Light-Emiting Nano Vesicles Self-Assembled from Bis-Urea Containing Fluorescent Molecules**
Fu Hsuan Liu, 17, Taipei First Girls High School, Taipei City, Chinese Taipei
Ting Hu, 16, Taipei First Girls High School, Taipei City, Chinese Taipei

**Fourth Award of $500**

CH011 **Comparative Analysis of Different Accelerants that Can Increase the Specific Impulse Generated by Solid Rocket Propellants**
Benjamin Michael Langer, 16, Herzlia High School, Cape Town, South Africa

CH017 **A Novel, Facile Two-Step Organocatalytic Asymmetric Synthesis of the Myristinin Core**
Louis Tao, 17, Louisiana School for Math, Science, and the Arts, Natchitoches, Louisiana

CH021 **Synthesis of Size- and Phase-Controlled Iron Oxide Nanoparticles via Continuous, Atmospheric Pressure Microplasma: An Efficient Source for Innovative Biomedical and Technological Applications**
Aric Generette Floyd, 17, Hawken Upper School, Gates Mills, Ohio

CH022 **An Inexpensive and Ultra-Compact Raman Spectrometer for Real World Applications**
Jack Thomas Andraka, 16, North County High School, Glen Burnie, Maryland

CH029 **Synthesis and Characterization of Nanometric Semiconductors**
Guy Avshalom Hofshi, 18, Leo Baeck Education Center, Haifa, Israel

CH037 **An Investigation of Cellulosic Ethanol: Oxidation of Hemicellulose and Lignin to Achieve High Conversion Yields of Cellulose to Glucose**
Hailey C. Loehde-Woolard, 15, Pacific Collegiate School, Santa Cruz, California

CH039 **From Waste Heat to Electricity: Synthesis and Analysis of a New Zintl Phase Compound for Thermoelectric Power Generation**
George Douglas Geng, 15, Irvington High School, Fremont, California

CH061 **Folding and Unfolding of Serum Albumin Proteins with Two-Photon Fluorescence Spectroscopy**
Gagan Ajay Gupta, 17, Kalamazoo Area Mathematics and Science Center, Kalamazoo, Michigan

CH306 **Hydrogen Production using Ultra Low-Cost Soybean-Molybdenum Catalysts**
Shilpa Iyer, 17, Comsewogue High School, Port Jefferson Station, New York
Shweta Iyer, 17, Comsewogue High School, Port Jefferson Station, New York

# Computer Science

**Intel will present Best of Category Winners with a $5,000 award. Additionally, a $1,000 grant will be given to their school and the Intel ISEF affiliated fair they represent.**

**Intel ISEF Best of Category Award of $5,000**

CS054 **Using Artificial Intelligence to Create a Low Cost Self-driving Car**
Ionut Alexandru Budisteanu, 19, Liceul Tehnologic Oltchim, Ramnicu Valcea, Romania

**First Award of $3,000**

CS031 **Cloud4Cancer Tackles Genetic Expression Profiles to Diagnose Leukemia**
Brittany Michelle Wenger, 18, The Out-of-Door Academy, Sarasota, Florida

CS054 **Using Artificial Intelligence to Create a Low Cost Self-driving Car**
Ionut Alexandru Budisteanu, 19, Liceul Tehnologic Oltchim, Ramnicu Valcea, Romania

CS063 **OrniLogicApp: A Study of Classifier Designs in Real-time Aviary Mapping Using Audio and GPS Data in Mobile Devices**
Ryan Kyong-Doc Chung, 16, Terre Haute South Vigo High School, Terre Haute, Indiana

**Second Award of $1,500**

CS002 **Building and Programming of a 3D-Scanner**
Fabian David Tschopp, 18, Kantonsschule Limmattal, Urdorf, Switzerland

CS008 **A New Stochastic Optimization Algorithm with Adaptive Penalty and Its Markov Chain Analysis**
Uttara Chakraborty, 17, Chakraborty Homeschool, Chesterfield, Missouri

CS017 **Breaking the Silence**
Elisabeth Anne Ashmore, 17, Plano East Senior High School, Plano, Texas

CS032 **3D Scanner**
London Reeve Bolsius, 15, Round Rock High School, Round Rock, Texas

CS047 **IlluminaMed: Developing New Artificial Intelligence Techniques for the Use In a Biomedical Image Analysis Toolkit**
Yousuf Mounir Soliman, 16, Canyon Crest Academy, San Diego, California

**Third Award of $1,000**

CS012 **A Topographic Pressure Equalization Approach to Facility Assignment with Capacity Constraints for Disaster and Emergency Response**
Apurv Hirsh Shekhar, 16, The Blake School, Minneapolis, Minnesota

CS014 **LAT (Location Aware Thermostat): Designing an Intelligent, Energy-Saving Thermostat**
Jarrod Darren Dunne, 15, Franklin Academy High School, Wake Forest, North Carolina

CS016 **Train the Artificial Brain: Diagnosis of Brain Tumors Using Neural Networks**
Roma Vivek Pradhan, 16, Friendswood High School, Friendswood, Texas

CS034 **Simulation of Approximate Computing Applied to Numerical Methods**
Alexandra Marie Porter, 17, La Cueva High School, Albuquerque, New Mexico

CS040 **Pardus: A Statistical Approach to Reduce Perceived Latency in Network Filesystems**
Dhaivat Nitin Pandya, 15, Appleton North High School, Appleton, Wisconsin

CS053 **Mobile Vision: An Efficient Algorithm and Its Applications**
Fan Zhang, 18, Lisgar Collegiate Institute, Ottawa, Canada

CS311 **Seeing Eye Pad: Navigation Assistance for the Visually Impaired**
Nathanael Graham Christenson, 17, Chengdu International School, Chengdu, China
Kevin Kaiyi Chow, 16, Chengdu International School, Chengdu, China
Luke Alexander Schuster, 16, Chengdu International School, Chendu, China

CS314 **The Introduction of Higher-Order Encoding for Synthesizing Quantum Automata and an Analysis of Novel Encoding Mechanisms**
Ankit Gupta, 17, Westview High School, Portland, Oregon
Kevin Wang, 18, Westview High School, Portland, Oregon

**Fourth Award of $500**

CS003 **Battle for Speed: Ternary against Binary**
Alexander Mikhailovich Makarychev, 17, Lyceum #3, Sarov, Russia

CS005 **Development of a Relativistic Raytracer**
Julius Kunze, 18, Johannes-Kepler-Gymnasium Chemnitz, Chemnitz, Germany

CS011 **EyeTrack: Improving the Lives of Paralysis Victims by Using Webcam Eye Tracking**
Noah David Simpson, 15, Harmony School of Innovation-Fort Worth, Fort Worth, Texas

CS024 **Improving Algorithms for the Optimal Allocation of Security Resources**
Arjun Milind Tambe, 15, Palos Verdes Peninsula High School, Rolling Hills Estates, California

CS037 **iSurface4U: Your Own Interactive Surface**
Andrii Konovalenko, 16, Multidisciplinary Gymnasium 15, Stakhanov, Ukraine

CS052 **SKYNET: Modeling Spatiotemporal Systems with Recurrent Neural Nets**
Anand Srinivasan, 16, Roswell High School, Roswell, Georgia

CS067 **A Telemedicine Tool for Monitoring Parkinson's: Using Microsoft Kinect to Engineer the Parkinsons Proto Tracker**
Darius Witold Bieganski, 17, Breck School, Golden Valley, Minnesota

CS307 **A Heuristic Method for Determining Distance-Optimal Supercomputer Interconnection Networks**
Kevin Li Huang, 16, Jericho High School, Jericho, New York

Mustafa Abid Ansari, 16, Plainview-Old Bethpage John F. Kennedy High School, Plainview, New York

CS317 **New Screening Method for Early Pediatric Cancer Detection through Automated Handwriting Analysis**
Abdelrahman Mohamed Elsayed Abdelmoneim, 17, Hoda Sharawy Experimental Language School, Alexandria, Egypt
Omar Khaled Obeya, 17, Victory College, Alexandria, Egypt
Sara Samir Hagras, 18, El-Raml Secondary School for Top Girls, Alexandria, Egypt

CS319 **A New Algorithm for the Triangulation of Polygons Using Recursive Diagonal Creation**
Conner Thomas Ruhl, 16, Governor French Academy, Belleville, Illinois
Forrest Channing Hunter, 17, Governor French Academy, Belleville, Illinois

# Earth & Planetary Sciences

**Intel will present Best of Category Winners with a $5,000 award. Additionally, a $1,000 grant will be given to their school and the Intel ISEF affiliated fair they represent.**

**Intel ISEF Best of Category Award of $5,000**

EA013 **Ignored Micro Seashells Tell Ancient Marine Environment**
Gyou Tanaka, 16, Chiba High School, Chiba, Japan

**First Award of $3,000**

EA013 **Ignored Micro Seashells Tell Ancient Marine Environment**
Gyou Tanaka, 16, Chiba High School, Chiba, Japan

**Second Award of $1,500**

EA015 **Impact Assessment of Sea Level Rise on Hurricane-Induced Flooding and Inundation in the Northern Gulf Coast**
Taide Ding, 18, Oxford High School, Oxford, Mississippi

**Third Award of $1,000**

EA009 **A Novel Approach to Locating Geothermal Systems in Relation to Geodetic Crustal Deformation and Strain Rate Tensors**
Benjamin Isaac Pleat, 17, Herricks High School, New Hyde Park, New York

EA303 **Causes of Offshore Rain Bands along the Northeastern Coast of Taiwan**
Yu-Sy Lin, 17, Taipei Municipal Chien-Kuo Senior High School, Taipei, Chinese Taipei
I-Tzu Chen, 18, Taipei Municipal Chien-Kuo Senior High School, Taipei, Chinese Taipei

**Fourth Award of $500**

EA001 **Subtropical Study of Mine Drilled Lakes and Their Effects on Evaporation and Evapotranspiration**
Breanne Mattea Williams, 18, South Sumter High School, Bushnell, Florida

EA014 **The Effects of Vorticity on Vortex Formation and Morphology**
David Patrick Murphy, 15, Los Alamos High School, Los Alamos, New Mexico

# Engineering: Electrical and Mechanical

**Intel will present Best of Category Winners with a $5,000 award. Additionally, a $1,000 grant will be given to their school and the Intel ISEF affiliated fair they represent.**

**Intel ISEF Best of Category Award of $5,000**

EE064 **A Novel Modular Repulsive Type Hybrid Magnetic Bearing for FES Systems**
Zeyu Liu, 17, Sir Winston Churchill High School, Calgary, Canada

**First Award of $3,000**

EE029 **Ridge Cutting Machine**
Pubudu Dinesh Anuruddha Chithrananda Kapuge Kapurubandage, 19, Mihinthale Central College, Anuradhapura, Sri Lanka

EE064 **A Novel Modular Repulsive Type Hybrid Magnetic Bearing for FES Systems**
Zeyu Liu, 17, Sir Winston Churchill High School, Calgary, Canada

EE091 **Biometric Electromechanical Firearm Safety**
Kai Thorin Kloepfer, 16, Fairview High School, Boulder, Colorado

**Second Award of $1,500**

EE002 **Modular Multifunction Sensor and Measurement Device Design and Implementation**
Marek Novak, 18, Gymnazium Ceske Budejovice, Ceske Budejovice, Czech Republic

EE004 **Development of a New Communication Method and Mechanism for Deaf-blind People**
Isaac Christopher Portocarrero-Mora, 18, Colegio Vocacional Monsenor Sanabria, San Jose, Costa Rica

EE008 **Vertical Axis Wind Turbine Farm Configuration Efficiency Based on Schools of Fish in Nature**
Yenny Dieguez, 15, Jose Marti MAST 6-12 Academy, Hialeah, Florida

EE053 **FPGA-Based Controller for High Frequency Induction Heating**
Weston Daniel Braun, 17, San Dieguito Academy, Encinitas, California

EE056 **Turbopulse: A Resilient Hybrid Pulsating Turbine Jet Engine**
David Andrew Zarrin, 18, Saratoga High School, Saratoga, California

EE306 **Super-thin Printing Device**
Yiou Fei, 18, High School No. 7 Chengdu, Sichuan, Chengdu, China
Miaoxin Gong, 18, High School No. 7 Chengdu, Sichuan, Chengdu, China

Yu Zuo, 18, High School No. 7 Chengdu, Sichuan, Chengdu, China

EE309 **ABCS: Automatic Buoyancy Control System**
Idan Hadar Sharon, 17, Hof HaCarmel Comprehensive School, Ma'agan Michael, Israel
Omer Granek, 17, Hof HaCarmel Comprehensive School, Ma'agan Michael, Israel

**Third Award of $1,000**

EE024 **New Coaxial Loudspeaker**
Gergely Papp, 19, Szegedi Muszaki es Kornyezetvedelmi Kozepiskola es Szakkepzo Iskola Gabor Denes Tagintezmenye, Szeged, Hungary

EE025 **Ion Propulsion: Electrostatic Thruster Design and Optimization for Space Applications**
Matthew Garrett Hileman, 15, The Classical Academy College Pathways, Colorado Springs, Colorado

EE037 **An "EXTRA" Sense: Ultrasound Glove Assisting Spatial Orientation of the Visually Impaired**
Ivan Seleznov, 17, Specialized School No. 22, Mykolaiv, Ukraine

EE043 **Water for the World (Year Three): A High Efficiency Combined Evaporator and Condenser for Solar Water Purification**
Katherine Lee Zimmerman, 17, Braden River High School, Bradenton, Florida

EE055 **Robotic Glass Cleaner**
Sohail Arif Abdulla, 17, Mount Roskill Grammar School, Auckland, New Zealand

EE074 **Multipurpose Cane-guide for Blind People**
Pavel Igorevich Kurbatskiy, 17, MOU Gimnazia N1, Armavir, Russia

EE077 **A Microprocessor Controlled Device with Cloud Connected Sensors for Improving Cardiovascular Health and Workout Efficacy**
Alisha Saxena, 16, Interlake Senior High School, Bellevue, Washington

EE080 **Rocket Motor Test System 7000**
Ryan Russell Maurer, 18, Frazier High School, Perryopolis, Pennsylvania

EE085 **Man Overboard!**
Samuel Wheelhouse, 19, Nottingham High School, Nottingham, United Kingdom

EE317 **Smart Alert Washer**
Mei Kam, 18, Sheng Kung Hui Li Ping Secondary School, Hong Kong, Hong Kong
Jia Ying Zhong, 18, Sheng Kung Hui Li Ping Secondary School, Hong Kong, Hong Kong
Mei Di Zhu, 17, Sheng Kung Hui Li Ping Secondary School, Hong Kong, Hong Kong

**Fourth Award of $500**

EE012 **Powering the World: The Design and Development of a Green Energy Technology**
Marcus James Langevin, 18, Lincoln Senior High School, Thief River Falls, Minnesota

EE019 **Web-Enabled Programmable Water Heater Controller**
David Prilutsky, 16, Dr. Ronald E. McNair Academic High School, Jersey City, New Jersey

EE023 **Invisible Key**
Jianing Liu, 17, Northeast Yucai School, Shenyang, China

EE027 **A Foldable Solar Panel with an Improved Hill Climbing MPPT Circuit**
Alexander Lee Chen, 17, Palos Verdes Peninsula High School, Rolling Hills Estates, California

EE046 **Germitron: Robotic Assessment of Seed Vitality**
Ema Linnea Parker, 15, West High School, Salt Lake City, Utah

EE054 **Motion-Copy Robot**
Scott Si Jian Guan, 16, Chengdu International School, Chengdu, China

EE060 **Apparatus and Analysis Techniques for Miniature Pulsed Plasma Sources**
Adam Joseph Bowman, 17, Montgomery Bell Academy, Nashville, Tennessee

EE070 **Optimising Operational Performance of a Thermoelectric Generator**
Kyle Francis Leong Willimott, 16, Barker College, Hornsby, Australia

EE072 **Ships Rescue System**
Ahmed Atef Saber, 15, Lycee la Liberte D'Alexandrie, Alexandria, Egypt

EE076 **Self-diagnosing Smart Bolts to Save Your Life**
Vladislav Sevostianov, 15, Las Cruces High School, Las Cruces, New Mexico

EE090 **Continuous Real-Time Monitoring, Detection, Alert of Transient Cardiac Abnormalities Utilizing Electrocardiograph Circuit and Android-Based Analysis with Communication through Wireless Networks**
Andrew Wei Chen, 15, Beaverton High School, Beaverton, Oregon

EE316 **VIBRASOR: A Device that Emits a Vibration and a Light Signal to Alert People with Reduced Hearing**
Isamar Cartagena, 17, IE Juan Nepomuceno Cadavid, Itagui, Colombia
Katherine Fernandez, 20, IE Juan Nepomuceno Cadavid, Itagui, Colombia

EE320 **An Automatic Environmental Monitoring System: Application to Aquaponics for Home Grown Food**
Cuong Nhut Truong, 17, Le Hong Phong High School for the Gifted, Ho Chi Minh, Vietnam
Duy Phuong Nguyen, 17, Le Hong Phong High School for the Gifted, Ho Chi Minh, Vietnam
Chau Ngoc Tran, 17, Le Hong Phong High School for the Gifted, Ho Chi Minh, Vietnam

# Environmental Management

**Intel will present Best of Category Winners with a $5,000 award. Additionally, a $1,000 grant will be given to their school and the Intel ISEF affiliated fair they represent.**

**Intel ISEF Best of Category Award of $5,000**

EM040 **Use of Co-Solvents to Enhance Astaxanthin Extraction from *L. setiferus* Shells with Vegetable Oils**
Shixuan Justin Li, 15, Rutherford High School, Panama City, Florida

## First Award of $3,000

EM040 **Use of Co-Solvents to Enhance Astaxanthin Extraction from *L. setiferus* Shells with Vegetable Oils**
Shixuan Justin Li, 15, Rutherford High School, Panama City, Florida

EM315 **Filamentous Fungi Cultivation on Moonshine Distillate Residues and Thin Stillage to Produce Reusable Water and a High-Value Fish Food Co-Product**
John Edward Hale, 17, Morristown Hamblen High School East, Morristown, Tennessee
Sydney Veronica Burchell, 16, Morristown Hamblen High School East, Morristown, Tennessee

## Second Award of $1,500

EM012 **The Effect of Polymer-Coated Nitrogen Fertilizers on Nitrous Oxide Emissions**
Aaron Chu Solomon, 18, Eleanor Roosevelt High School, Greenbelt, Maryland

EM046 **Tea for a Clean Sea: The Use of Common Porous Materials to Filter Polluted Water**
Sugirtha Panneerselvam, 17, Plano East Senior High School, Plano, Texas

EM056 **Endocrine Disrupter Remediation in Fresh Water: Exploration of Mycoremediation Capabilities of Fungi**
Rachel Louise Rossi, 17, Durango High School, Durango, Colorado

EM304 **The Effect of Single-Walled Carbon Nanotubes on Regeneration and Activity of *Dugesia dorotocephala*, Growth of *Chlorella vulgaris,* and Embryonic Development of *Lytechinus variegatus***
Archie Chakming Kong, 16, Manhasset Secondary School, Manhasset, New York
Randy Tung, 16, Manhasset Secondary School, Manhasset, New York
Arthur Wang, 16, Manhasset High School, Manhasset, New York

## Third Award of $1,000

EM015 **BIO-OIL: The Use of Specially Made Catalyst**
Nur Liyana Johari, 17, Tuanku Syed Putra Secondary Science School, Kangar, Malaysia

EM017 **Remediating Radioactive Contamination: Investigating the Effects of Chelating Agents and Growth-Promoting Bacteria on Strontium Phytoremediation in Lycopersicon esculentum**
Haley Roman Sproull, 18, Niles North High School, Skokie, Illinois

EM022 **A Model-Based Approach to Predicting Species' Responses to Climate Change by Characterizing Community Dynamics**
Emily Elizabeth Baczyk, 17, Choate Rosemary Hall, Wallingford, Connecticut

EM025 **Replacing Super Absorbent Polymers in Disposable Diapers with Sugarcane Bagasse**
Salvador Alvarado, 16, Escola Americana De Campinas, Campinas, Brasil

EM043 **Removal of Copper from Aqueous Solutions through Spent Bleaching Earth**
Apisada Chulakadabba, 17, Mahidol Wittayanusorn School, Nakhon Pathom, Thailand

EM052 **The Replacement of Fishmeal with Formulated Sustainable Meals and Its Effect on the Growth of *Litopenaeus vannamei***
Olivia Kaye Joslin, 17, Hilton Head Island High School, Hilton Head Island, South Carolina

EM305 **The Environmental Innovational Uses of Endothermic Reactions**
Bisher Ghaleb Assamak, 17, Modern Montessori School, Amman, Jordan
Amer Mohammad Sawalha, 16, Modern Montessori School, Amman, Jordan

**Fourth Award of $500**

EM005 **Further Studies in Biofilm Removal of Wastewater Contaminants**
Monica Elizabeth McFadden, 18, Notre Dame Academy, Park Hills, Kentucky

EM009 **Reduce, Reuse, Recycle: The Effects of Nitrate Phytoremediation in Contaminated Freshwater Aquaculture Wastewater Using *Triticum aestivum*, Year Two**
Valerie Rochel Gamayot Gamao, 18, James Madison High School, San Antonio, Texas

EM021 **A Sustainable and Low Cost Approach for Cleaning Metal Contaminated Water Using Pyrolyzed Banana Peels**
Bluye B. DeMessie, 16, William Mason High School, Mason, Ohio

EM023 **Revolutionizing Oil Spill Remediation via Modified *Luffa cylindrica***
Kristin Nicole Wong, 17, Jericho High School, Jericho, New York

EM033 **Using Spent Coffee Grounds in Purifying Drinking Water and Removing Odour in Air**
Tsui Yee Naomi Ko, 17, St. Paul's Convent School, Hong Kong, Hong Kong

EM044 **Study of TENORM Deposits in Oil Field Equipment**
Alexander James Spilman, 17, Mandan High School, Mandan, North Dakota

EM048 **Invasive Barge In: Is a Voltage Void Produced by Barges Crossing Electronic Fish Barriers?**
Brandon Brady Benninger, 18, Boone Grove Senior High School, Valparaiso, Indiana

EM303 **Stirling Engine Utilizing Biogas as Fuel**
Switt Kongdachalert, 17, Triamudom Suksa School, Bangkok, Thailand
Tawatwong Tunchavanich, 18, Triamudom Suksa School, Bangkok, Thailand
Pakawat Panuwatsuk, 18, Triamudom Suksa School, Bangkok, Thailand

EM306 **Use of *Pseudomonas stutzeri* to Reduce Seawater Chlorides**
Agatha Lottermann Selbach, 19, Fundacao Escola Técnica Liberato Salzano Vieira da Cunha, Novo Hamburgo, Brasil
Desiree de Boer Velho, 19, Fundacao Escola Tecnica Liberato Salzano Vieira da Cunha, Novo Hamburgo, Brasil

# Engineering: Materials and Bioengineering

**Intel will present Best of Category Winners with a $5,000 award. Additionally, a $1,000 grant will be given to their school**

and the Intel ISEF affiliated fair they represent.

Intel ISEF Best of Category Award of $5,000

EN049 **Advances in the Bottom-Up Assembly of Multicellular Architectures: From Neuroengineering to Biodefense**
Samantha Marie Marquez, 17, Maggie L. Walker Governor's School, Richmond, Virginia

First Award of $3,000

EN049 **Advances in the Bottom-Up Assembly of Multicellular Architectures: From Neuroengineering to Biodefense**
Samantha Marie Marquez, 17, Maggie L. Walker Governor's School, Richmond, Virginia

EN065 **Assembly of Magnetic Particles and Magnetic Holes into 1D, 2D, and 3D Photonic Crystals**
Michael Leonard Janner, 17, Redlands East Valley High School, Redlands, California

Second Award of $1,500

EN015 **The Fabrication and Characterization of Top and Bottom Gated Carbon Nanotube Field Effect Transistors Using Printed Electronics**
Harsha Sudarsan Uppili, 16, Oregon Episcopal School, Portland, Oregon

EN022 **An Advanced Biomimetic Hand Using Additive Manufacturing**
Holly Catherine Erickson, 17, Los Alamos High School, Los Alamos, New Mexico

EN023 **Optimization of Platlet-Targeted Multifunctional Nanovehicles for Vascular Disease Detection and Therapy**
Gurbani Kaur, 18, Hathaway Brown School, Shaker Heights, Ohio

EN027 **A Robust Human Fall Detection Wireless System**
Nathaniel G. Varghese, 15, Folsom High School, Folsom, California

EN040 **Invisibility Two Steps Closer: An Analysis of Cylindrically Confined Diblock Copolymers and Gold Nanocomposites for Metamaterials**
Julia Beth Abelsky, 18, North Springs Charter High School, Sandy Springs, Georgia

Third Award of $1,000

EN006 **Enhanced Drug Delivery via PEG-crosslinked Mucin Hydrogels**
Connor Vo Duffy, 16, Mounds View High School, Arden Hills, Minnesota

EN020 **Optimization of Carbon Nanotube-based CFx Primary Battery Performance: Role of Fluorination**
Richard Nipun Gunasena, 14, duPont Manual Magnet High School, Louisville, Kentucky

EN030 **Promotion of Wound Healing via a Novel Hydrophilic Dressing**
Mallory Claire Madfes, 17, Greenwich High School, Greenwich, Connecticut

EN042 **Endocytosis of Orthopedic Wear Debris by Osteoblasts: Particle Size-, Treatment Time-, and Uptake**

Pathway-Dependencies
Ian A. Hardy, 18, Northern Utah Academy for Math, Engineering & Science, Layton, Utah

EN061 **Use of Polymer Substrates to Regulate the Differentiation of Mouse Embryonic Stem Cells**
Benjamin Thomas Lei, 17, Arlington High School, LaGrangeville, New York

EN062 **Enhancing Quantum Dot Solar Cells with Metal Nanoparticles**
Alexander Jordan McBride, 18, McBride Homeschool, Medford, New Jersey

EN317 **Efficient Algae-Based Life Support for Long Duration Spaceflight**
Alexander Raymond Crisara, 18, L.C. Anderson High School, Austin, Texas
Alexander Jahan Rabii, 16, L.C. Anderson High School, Austin, Texas

**Fourth Award of $500**

EN016 **Creating a Radiating Structure for Breast Cancer Self-Detection Using Microwaves**
Sheila S. Chandrahas, 18, Texas Academy of Mathematics and Science, Denton, Texas

EN021 **Studying Bone Matrix Formation via Bioengineering Approach**
Karan Babbarwal, 16, duPont Manual Magnet High School, Louisville, Kentucky

EN028 **The Effect of Chemical Crosslinking on the Structural and Mechanical Properties of Extracellular Matrix-Fibrin Hydrogel Scaffolds**
Erica Budina, 17, Medford High School, Medford, Massachusetts

EN034 **Stoichiometric Laser-Induced Breakdown Spectroscopy (LIBS) Analysis for Simple and Cost Effective Production of Optical Quality Ceramic Yttrium Aluminum Garnet (YAG)**
Matthew Leong Chun, 16, Jericho High School, Jericho, New York

EN038 **Evaluation of Polyvinyl-Alcohol Polymers as an Effective Shielding Mechanism Against Ionizing Radiation Induced Degradation in COTS Microcontroller Devices**
Christopher Louis Panuski, 18, North Carolina School of Science and Mathematics, Durham, North Carolina

EN052 **Functionalized Cellulose Nanocrystals: An Effective Antimicrobial Agent**
Janelle Tam, 17, Waterloo Collegiate Institute, Waterloo, Canada

EN306 **Ecological Blocks with Pressure without Baking**
Martin Uranga Vega, 16, Colegio San Ignacio, Tandil, Argentina
Delfina Frolik, 17, Colegio San Ignacio, Tandil, Argentina

EN311 **Developing Soft Micro-stencil Lithography for the Fabrication of Electrodes on Nano-materials**
Waqarul Islam, 16, Stuyvesant High School, New York, New York
Youbin Kim, 16, Stuyvesant High School, New York, New York

EN314 **The Use of Nanoparticles to Decrease the Coefficient of Refraction in Oil Reservoirs for Improving 4D Seismic Surveys**
Rund Essam Tawfiq, 17, Dhahran Ahliyya schools, Dammam, Saudi Arabia
Sarah Hasan Al Abdullatif, 16, Dhahran Ahliyya schools, Dhahran, Saudi Arabia

EN318 **Microfiltration Property of Chicken Eggshell Membrane and Potential Usage in Portable Water Filtering Device**
Huong Mai Vu, 18, Hanoi-Amsterdam High School, Hanoi, Vietnam
Anh Trong Nam Hoang, 17, Hanoi-Amsterdam High School, Hanoi, Vietnam
Linh Thuy Do, 17, Ha Noi - Amsterdam High School, Hanoi, Vietnam

# Energy and Transportation

**Intel will present Best of Category Winners with a $5,000 award. Additionally, a $1,000 grant will be given to their school and the Intel ISEF affiliated fair they represent.**

**Intel ISEF Best of Category Award of $5,000**

ET032 **Algae to Oil via Photoautotrophic Cultivation and Osmotic Sonication**
Evie Sobczak, 16, Shorecrest Preparatory School, St. Petersburg, Florida

**First Award of $3,000**

ET017 **Wind Energy: An Economical Alternative**
Bradley Derek Sloop, 18, Susquenita High School, Duncannon, Pennsylvania

ET032 **Algae to Oil via Photoautotrophic Cultivation and Osmotic Sonication**
Evie Sobczak, 16, Shorecrest Preparatory School, St. Petersburg, Florida

**Second Award of $1,500**

ET007 **Looking Past Petroleum: Growing Biofuel Using Brine from Abandoned Oil Wells**
Trisha Dalapati, 15, Centennial High School, Roswell, Georgia

ET044 **Novel Materials for Organic Solar Cells**
Valerie Youngmi Sarge, 15, Paul Laurence Dunbar High School, Lexington, Kentucky

ET058 **The Improved Efficiency and Enhanced Lifetime of a Solar Cell Based on Modified Photosynthetic Pigments**
Nathan Sai Kondamuri, 18, Munster High School, Munster, Indiana

ET301 **Ecological Hypergolic Propellants**
Massimo Cappelletto, 19, Isis Malignani, Udine, Italy
Davide Zilli, 19, Isis Malignani, Udine, Italy

ET316 **DRT - Drag Reduction Technology**
Herbert Gerhardter, 19, HTBLA Eisenstadt, Eisenstadt, Austria
David Josef Zefferer, 20, HTBLA Eisenstadt, Eisenstadt, Austria

**Third Award of $1,000**

ET025 **The Effect of Different Variations of an Impeller Type Vertical Axis Wind Turbine on Its Efficiency**
Richard Scott Middaugh, 16, Central Virginia Governor's School/Brookville High School, Lynchburg, Virginia

ET033 **A Study of Zero-Crossings in Fractal-Generated Turbulence**
Nathan Vincent Greene, 17, Baltimore Polytechnic Institute, Ingenuity Project, Baltimore, Maryland

ET036 **Utilizing Novel Graphene Oxide Langmuir-Blodgett Film Catalysts to Enhance the Cost Efficiency of a PEM Fuel Cell**
Andrew M. Chen, 17, Dougherty Valley High School, San Ramon, California

ET039 **Enhancement of Biofuel Production through Novel Bioelectrosynthesis Characterization of *E. coli***
Sruti Arulmani, 15, Glenforest Secondary School, Mississauga, Canada

ET047 **Aerodynamic Principles of Golf Balls: An Alternative to the Exterior Design of Heavy Vehicles**
Daniela Alejandra Plascencia Jimenez, 17, Preparatoria del Tecnologico de Monterrey, Campus Guadalajara, Zapopan, Mexico

ET054 **Year Two of Developing Robotic Technology to Make a Handicap Independent**
Precious Naomi Martinez, 16, Union City High School- AEA, Union City, New Jersey

ET319 **Thin Film Biopolymer-based Rechargeable Battery**
Chun Sang Pun, 17, The Chinese Foundation Secondary School, Hong Kong SAR, Hong Kong
Chi Sum Wong, 16, The Chinese Foundation Secondary School, Hong Kong SAR, Hong Kong
Chun Kit Jason Lo, 16, The Chinese Foundation Secondary School, Hong Kong, Hong Kong

**Fourth Award of $500**

ET003 **Investigating the Use of Anaerobic Fermentation on Pretreated Biomass to Streamline Bio-fuel Production**
Jonah Z. Butler, 15, Sibley East High School, Arlington, Minnesota

ET004 **A Current Event: Using Renewable Electrical Tidal Energy in the Production of Hydrogen Gas for Fuel Cells and Other Applications, Year Four of an Ongoing Study**
Kyle Scott Saleeby, 18, Niceville High School, Niceville, Florida

ET019 **Enhancing the Efficiency of a PEM Hydrogen Fuel Cell with Synthesized Metal-Nanoparticle/Graphene Composites Synergy**
Benjamin Akhavan, 18, Rambam Mesivta High School, Lawrence, New York

ET027 **Novel Fe2O3 and Sulfur Catalyzed Rocket Propellants: A Synergistic Approach to the Sorbitol "Flushing"□ Phenomenon**
Parth Chetan Thakker, 16, North Carolina School of Science and Mathematics, Durham, North Carolina

ET035 **Configuring a Biplane Airfoil for Practical Application and Sonic Boom Reduction in Subsonic to Supersonic Flow through Performance Optimization**
Sumukh S. Bharadwaj, 17, Capital High School, Olympia, Washington

ET052 **Maximizing the Energy Efficiency of Biodiesel Processing: The Effect of the Angular Velocity of Agitation of Methoxide and Biodiesel on the Energy Consumption of a Biodiesel Processor, and an Original Method of Zero-Energy Dry Washing on the Purity of the Product**
Meredith Rose Barr, 17, Cheltenham High School, Wyncote, Pennsylvania

ET055 **A Novel Single-Compartment Concentration Cell Driven by Natural Evaporation for Green Energy Harvesting**
Andrew Yang, 16, Northside Health Careers High School, San Antonio, Texas

ET061 **Boosting Current of Quantum Dot Sensitized Solar Cells with CdS/PbS Heterostructures**
Alexander Darien Mobashery, 18, Penn High School, Mishawaka, Indiana

ET309 **Efficiently Increasing Rate of Hydrogen Production in Water Electrolysis Driven by Solar Energy**
Omar Al-Majeed Imad Yared, 16, Modern Montessori School, Amman, Jordan
Ibrahim Zuhair Al Saidi, 16, Modern Montessori School, Amman, Jordan

ET314 **Bioethanol Production by Fermentation of Rejection Banana**
Dulce Alajandra Franco Castillo, 18, Centro de Bachillerato Tecnologico Industrial y de Servicios No. 172, Cortazar, Mexico
Mario Alberto Martinez Garcia, 18, Centro de Bachillerato Tecnologico Industrial y de Servicios No. 172, Cortazar, Mexico

# Environmental Sciences

**Intel ISEF Best of Category Award of $5,000**

EV008 **Development and Optimization of a Novel VOC Biofilter to Remediate Indoor Air Pollution (IAP) Sustainably PLUS an Analysis of Its Impact on Human Lung Health after Integration**
Naomi Chetan Shah, 17, Sunset High School, Portland, Oregon

**First Award of $3,000**

EV008 **Development and Optimization of a Novel VOC Biofilter to Remediate Indoor Air Pollution (IAP) Sustainably PLUS an Analysis of Its Impact on Human Lung Health after Integration**
Naomi Chetan Shah, 17, Sunset High School, Portland, Oregon

EV036 **Modeling Estuarine Salinity Using Artificial Neural Networks**
Christopher Wan, 17, Alexander W. Dreyfoos School of the Arts, West Palm Beach, Florida

**Second Award of $1,500**

EV001 **Fluorescent Quantum Dots as a Solid-Phase Detection Medium for Heavy-Metal Contaminates in Drinking Water**
Rikhav Shah, 15, Lake Highland Preparatory School, Orlando, Florida

EV014 **An Inquiry into the Effect of the Environmental Pollutant Acrylic Aldehyde on Neutrophil Activation**
Sanjana Jagdish Rane, 15, duPont Manual Magnet High School, Louisville, Kentucky

EV030 **The Role of Heavy Metal Resistant Bacteria (*Bacillus megaterium*, *Bacillus licheniformis*) on the Bioaccumulation of Lead in *Helianthus annuus***
Cindy Y. Jiang, 17, Central High School, St. Joseph, Missouri

EV031 **Home-Based Rapid Arsenic Water Test Using Nanotechnology**
Thabit Farrukh Pulak, 17, Richardson High School, Richardson, Texas

**Third Award of $1,000**

EV017 **Use of Biosorbent for Removal of Colour and Heavy Metal from Dyed Waste Water**
Sarah Jia Xin Wong, 16, SMK Batu Lintang, Kuching, Malaysia

EV018 **A Four Year Mathematical Analysis as a Predictor of Dams Impact on Biodiversity and Stream Recovery**
Aimee Michelle Turner, 18, Ballard High School, Louisville, Kentucky

EV023 **The Toxin in Rice—Arsenic in Our Food**
Anuush Krishna Vejalla, 14, Detroit Country Day Upper School, Beverly Hills, Michigan

EV024 **Examining the Global Carbon Crisis: The Impact of Increased Carbon Dioxide on the Biological Processes and Carbon Sequestration of the Diatom *Licmophora flabellata***
Rachel Elizabeth Sereix, 15, University School of Nova Southeastern University, Fort Lauderdale, Florida

EV034 **Differential Gene Expression in Lead-exposed *Saccharomyces cerevisiae***
Preksha Bhagchandani, 17, Pine Crest School, Ft. Lauderdale, Florida

EV041 **H20h No: Pharmaceuticals Are in My Groundwater! Removal of Sulfamethazine by Hypercrosslinked Adsorbent MN250 in Simulated Groundwater**
Maria Elena Grimmett, 14, Oxbridge Academy of the Palm Beaches, West Palm Beach, Florida

**Fourth Award of $500**

EV003 **Impacts of Biochar on Soil Greenhouse Gas Emissions, Soil Moisture, and Crop Polycyclic Aromatic Hydrocarbon (PAH) Concentrations**
Rena Dorothy Weis, 18, New Prague Senior High School, New Prague, Minnesota

EV005 **Mining Mystery: The Effect of Acid Mining (Sulfur Compounds) on Bacillus Mycoides Found on the Stalk of Wild Rice (*Zizania palustris*)**
Cassandra Lynn Roy, 18, Cloquet Senior High School, Cloquet, Minnesota

EV016 **Got Male? Does Triclosan Cause Endocrine Disrupting Effects in *Daphnia magna*?**
Anna Elizabeth Sappington, 16, South River High School, Edgewater, Maryland

EV027 **Silent Protection**
Raghda O.J. Eshtayeh, 15, Salem Secondary Girls School, Nablus, Palestine

EV033 **A Molecular and Morphological Study of *Candidatus pasteuria aldrichii* to Various Nematode Species as a Biological Control**
Kiona Rajene Elliott, 18, Northeast High School, Oakland Park, Florida

EV042 **Effects of Ecological Differences on Biofilm Composition in the Red Sea**
Reem Ahmed Al Rabiah, 17, Altarbia Alislamia Schools, Riyadh, Saudi Arabia

EV048 **Protective Role of Selenium against Methylmercury Poisoning in House Crickets (*Acheta domesticus*)**
Devarshi Nikhil Patel, 16, Red River Senior High School, Grand Forks, North Dakota

EV301 **A Novel Model for Inflammatory Bowel Disease: Using U937 and COLO320DM Cell Lines, to Propose a Pathway by which Environmental Toxin, 4-Nonylphenol, May Promote an Inflammatory Response**
Albert Kim, 17, Manhasset Secondary School, Manhasset, New York

Byeong Ho Jung, 15, Herricks High School, New Hyde Park, New York

# Mathematical Sciences

**Intel will present Best of Category Winners with a $5,000 award. Additionally, a $1,000 grant will be given to their school and the Intel ISEF affiliated fair they represent.**

### Intel ISEF Best of Category Award of $5,000

MA011 **Efficient Characteristic 3 Galois Field Operations for Elliptic Curve Cryptographic Applications**
Vinay Sridhar Iyengar, 17, Oregon Episcopal School, Portland, Oregon

### First Award of $3,000

MA011 **Efficient Characteristic 3 Galois Field Operations for Elliptic Curve Cryptographic Applications**
Vinay Sridhar Iyengar, 17, Oregon Episcopal School, Portland, Oregon

MA026 **Lower Central Series Quotients of Finitely Generated Algebras over the Integers**
Katherine Cordwell, 17, Manzano High School, Albuquerque, New Mexico

### Second Award of $1,500

MA025 **Closed-Form Volumes of a Wide Family of Astroidal Ellipsoids and the Hyperbolic Octahedron**
Salahaldeen Ibrahim Abu-Alshaikh, 16, Jubilee School, Amman, Jordan

MA031 **Matching Preclusion and Conditional Matching Preclusion for Dual-Cubes**
Akhil Nistala, 17, Novi High School, Novi, Michigan

MA038 **A Novel Approach to the Spherical Codes Problem**
Simanta Gautam, 17, Albemarle High School, Charlottesville, Virginia

MA302 **Simulation of Protein Folding using Monte Carlo Methods in a Triangular Lattice**
Niranjan Balachandar, 16, Shepton High School, Plano, Texas
Nirali Kunjan Thakor, 15, Shepton High School, Plano, Texas

### Third Award of $1,000

MA005 **Applications of Dirichlet Series**
Asbjorn Christian Nordentoft, 19, Aurehoj Gymnasium, Gentofte, Denmark

MA016 **Resolving an Open Problem Related to Figurate Numbers by Pell Equations**
Yu-Fang Hsu, 16, National Nanke International Experimental High School, Tainan, Chinese Taipei

MA021 **Kaprekar's Constant: A Journey to New Bases**
Daniel Matan Hanover, 15, John L. Miller Great Neck North High School, Great Neck, New York

MA032 **A Novel Mathematical Model of Cellular Apoptosis under the Influence of Hsp70**
Ashwin Pavan Ramachandran, 17, Randolph School, Huntsville, Alabama

MA033 **Electromechanical Modeling of the Heart in Moving Domains using the Phase-Field Method**
Kevin K. Lee, 16, University High School, Irvine, California

MA309 **Study of Integrals of Parametric Functions for Fermat's Curve of Third Degree**
Andres Josue Arroyo Colon, 17, Centro Residencial de Oportunidades Educativas de Mayaguez, Mayaguez, Puerto Rico
Edwin Sebastian Torres-Cuevas, 17, Centro Residencial de Oportunidades Educativas de Mayaguez, Mayaguez, Puerto Rico

**Fourth Award of $500**

MA006 **An Alternative Proof of the Pappus Chain Theorem using the Method of Circle Inversion**
Retselisitsoe Elias Monyake, 17, Harmony High School, Virginia, South Africa

MA012 **Classification of Some Fusion Categories of Rank 4**
Hannah Kerner Larson, 18, South Eugene High School, Eugene, Oregon

MA045 **Dots and Lines: A Combinatorial Interpretation of the Homotopy Groups of Finite Topologies**
Colin Campbell Aitken, 17, Leland High School, San Jose, California

MA053 **Analysis of Novel Clustering Algorithms for Gene Expression Patterns**
Shashwat Kishore, 16, Unionville High School, Kennett Square, Pennsylvania

MA057 **Superadditivity and Subadditivity in Fair Division**
Rishi Suvir Mirchandani, 16, Fox Chapel Area High School, Pittsburgh, Pennsylvania

MA060 **A Mathematical Analysis of Set Variants**
Evan Zheran Liu, 17, Albuquerque Academy, Albuquerque, New Mexico

MA304 **On the Stability of Lung Parenchymal Lesions with Applications to Early Pnemuothorax Diagnosis**
Rohan Bandopadhay Banerjee, 16, Thomas Jefferson High School for Science and Technology, Alexandria, Virginia
Archis Ramkrishna Bhandarkar, 17, Thomas Jefferson High School for Science and Technology, Alexandria, Virginia

MA306 **Dissection of square into 'N' congruent squares**
Nayana Ravindranath Koravatti, 16, Amrita Vidyalayam, Davangere, India
Aishwarya Chanchi Ashok, 16, Amrita Vidyalayam, Davangere, India

# Medicine and Health Sciences

**Intel will present Best of Category Winners with a $5,000 award. Additionally, a $1,000 grant will be given to their school and the Intel ISEF affiliated fair they represent.**

**Intel ISEF Best of Category Award of $5,000**

ME072 **Mustard Oil as an Apicomplexan-targeting Drug Therapy for *Plasmodium falciparum***

Jessie Leanne Preston MacAlpine, 17, Huron Park Secondary School, Woodstock, Canada

**First Award of $3,000**

ME016 **Programmable Multiplexed Immunosensor for Rapid Cardiac Diagnostics**
Andy Tran, 18, Michael E. DeBakey High School for Health Professions, Houston, Texas

ME059 **Advancing Precision Medicine: MicroRNA Prognostic Signatures and Prediction Models for Distant Metastasis-Free Survival in Breast Cancer**
Natalie Ng, 17, Monta Vista High School, Cupertino, California

ME068 **Designing a Novel Freeze-Stable Tetanus Vaccine**
Aryo Sorayya, 18, Monte Vista High School, Danville, California

ME072 **Mustard Oil as an Apicomplexan-targeting Drug Therapy for *Plasmodium falciparum***
Jessie Leanne Preston MacAlpine, 17, Huron Park Secondary School, Woodstock, Canada

**Second Award of $1,500**

ME009 **Hemodynamic Interactions in Arterial Networks with Atherosclerosis**
Aprotim Cory Bhowmik, 16, Parkview High School, Lilburn, Georgia

ME010 **Combinations of Immune Checkpoint Blockade Inhibitors and Lymphodepletion to Induce Myeloma Rejection**
Dominique Helen Tlomak, 16, University School of Milwaukee, Milwaukee, Wisconsin

ME039 **Controlling Diabetes and Its Complications by Dietary Supplementation of *Trigonella foenum gracem* (Fenugreek Seed), a Potent Antidiabetic Herb**
Soiba K. Mansoor, 16, Albuquerque Institute of Math and Science, Albuquerque, New Mexico

ME056 **Examination of Quorum Sensing Mechanisms in Glioblastoma Multiforme**
Easun Piraichoody Arunachalam, 16, Crescenta Valley High School, La Crescenta, California

ME067 **Breast Cancer Prognosis through Gene Expression Profiling and Tumor Morphology**
Andrew Cheng Jin, 16, The Harker School, San Jose, California

ME088 **Colorimetric Detection of *Plasmodium falciparum* via Aptasensor Technology**
Junyi (Sarah) Wu, 16, Assumption College School, Brantford, Canada

ME100 **Influence of Hemispheric Synchronization on Functioning of the Brain**
Kinga Panasiewicz, 17, High School in the Name of Stanislaw Staszic, Hrubieszow, Poland

**Third Award of $1,000**

ME018 **Somatostatin Type 3 Receptors Mediate Protective Effects Against Seizures**
Ari Shi Gao, 18, Texas Academy of Mathematics and Science, Denton, Texas

ME029 **Lung Tumor Associated Dendritic Cell-derived Resistin Promoted Cancer Progression by Increasing Wolf-Hirschhorn Syndrome Candidate 1/Twist Pathway**

Chih-Hsin Kuo, 16, The Affiliated Senior High School of National Kaohsiung Normal University, Kaoshiung, Chinese Taipei

ME030 **Automating Cancer Diagnosis: Utilizing Minkowski-Bouligand Dimension to Efficiently Grade Cells**
Daniel David White, 17, Somerset Berkley Regional High School, Somerset, Massachusetts

ME034 **LPS/BSA Contamination: Rethinking Fatty Acid Dietary Supplementation's Role in Oxidative Stress Production**
Olivia Frances Novick, 17, Jericho High School, Jericho, New York

ME042 **A Novel Cancer-Tailored Targeted Drug Delivery System**
Jay Harshad Mehta, 17, Port Huron Northern High School, Port Huron, Michigan

ME058 **Targeting Interactions in the Tumor Microenvironment as a Novel Treatment for Metastatic Lung Cancer**
Brianna Pereira, 16, Academy for Medical Science Technology, Hackensack, New Jersey

ME069 **Investigating the Role of Extracellular Calcium on the Proliferation and Insulin Secretion of Pancreatic Beta Cells in Insulin Dependent Diabetes Mellitus**
Rohan Anand Savoor, 16, Monte Vista High School, Danville, California

ME074 **A Synergistic Approach in Treating Cancer via Photothermal Therapy and HSP90 Inhibition**
Arjun Koodali Nair, 16, Webber Academy, Calgary, Canada

ME080 **Looking within the Lesion: Transcriptome of Psoriatic Skin Reveals Changes in Apoptosis Signaling and Genes Associated with Atherosclerosis**
Claudia Abrantes Mimoso, 18, Ossining High School, Ossining, New York

ME094 **Machine Learning Using Genomic Features Improves Gleason-Based Prostate Cancer Prognosis**
Joshua Ruohua Li, 15, Upper Dublin High School, Fort Washington, Pennsylvania

ME095 **Novel Nanoparticles for Drug Delivery**
Kishore Balasubramanian, 16, Klein Oak High School, Spring, Texas

**Fourth Award of $500**

ME005 **Identifying Novel DNA Methyltransferase 1 (DNMT1) Small Molecule Inhibitors for Cancer Treatment Year Two: Hybrid Structure and Ligand-Based Virtual Screening**
Alexander William Forsyth, 18, Episcopal High School of Jacksonville, Jacksonville, Florida

ME006 **Developing a Ligand-specific High Dielectric Strength Drug Model for Demyelination Disorders Using *Lutjanus buccanella in situ*, Year III**
Mohan Sai Ravi, 17, Stanton College Preparatory School, Jacksonville, Florida

ME013 **Year Three: The Role of Various Heat Shock Proteins and Amyloid-Beta in Alzheimer's Disease**
Meenakshi Bose, 15, Eastside High School, Gainesville, Florida

ME014 **Defining the Mechanisms of Aspirin in Cancer Prevention**
Andrew Liu, 16, Lakeridge High School, Lake Oswego, Oregon

ME015 **Alpha-Alumina Nanoparticles Activate the Nalp3 Inflammasome and IL-1b Production for Development of a Novel Therapeutic Cancer Vaccination**
Amber Tang, 16, Lakeridge High School, Lake Oswego, Oregon

ME045 **A Novel microRNA-based System for Cancer Management and Monitoring**
Jason Shao Cui, 17, Langley High School, McLean, Virginia

ME053 **Berberine: A Potential Natural Drug to Combat Oxidative Stress**
Sarthak Garg, 16, Little Rock Central High School, Little Rock, Arkansas

ME061 **The Role of P-Glycoprotein in Cancer Cell Multidrug Resistance: A Mechanistic Approach**
Lavanya Rajendra Garnepudi, 17, Centennial High School, Ellicott City, Maryland

ME073 **Understanding the Role of Platelet Derived Growth Factor in the Function of Glioblastoma Brain Tumor Stem Cells**
Sujay Nagaraj, 16, Western Canada High School, Calgary, Canada

ME079 **Establishing a Novel Pathophysiology of Autism and Cryptogenic Epilepsy induced by Toxoplasma Gondii Metabolomic Pathways to Originate Unprcedented Diagnostic Biomarkers**
Mohammed Abdulfattah Aldajani, 16, Dhahran Ahliyya School, Dhahran, Saudi Arabia

ME093 **Aberrant Methylation of the RASSF1A Gene as a Biomarker for the Detection of Hepatocellular Carcinoma**
Lijia Xie, 17, North Penn High School, Lansdale, Pennsylvania

ME109 **Are Niche Cells Critical for Bone Marrow Failure?: A Novel Approach to Tracing a Defective Bone Marrow as the Root Cause of Life-Threatening Blood Diseases**
Roshni Bag, 17, University High School of Indiana, Carmel, Indiana

ME113 **Developmental Gene Lis1 in the Adult Brain Is Necessary for Spatial But Not for Novelty Memory**
Leighton Anne Braunstein, 16, The Dalton School, New York, New York

ME311 **Pancreatic Adenocarcinoma: An Analysis of Drug Therapy Options**
Anvita Gupta, 15, BASIS Scottsdale, Scottsdale, Arizona
Sejal Aggarwal, 16, BASIS Scottsdale, Scottsdale, Arizona

# Microbiology

**Intel will present Best of Category Winners with a $5,000 award. Additionally, a $1,000 grant will be given to their school and the Intel ISEF affiliated fair they represent.**

**Intel ISEF Best of Category Award of $5,000**

MI039 **Site-directed Mutagenesis of the Metal-reducing Bacterium *S. oneidensis* MR-1: A Novel Strategy for Genetic Engineering in Recalcitrant Microorganisms**
David Masao Zimmerman, 18, Brentwood School, Los Angeles, California

**First Award of $3,000**

MI034 **Discovery of Novel Influenza Endonuclease Inhibitors to Combat Flu Pandemic**
Eric Shu Chen, 16, Canyon Crest Academy, San Diego, California

MI039 **Site-directed Mutagenesis of the Metal-reducing Bacterium *S. oneidensis* MR-1: A Novel Strategy for Genetic Engineering in Recalcitrant Microorganisms**
David Masao Zimmerman, 18, Brentwood School, Los Angeles, California

**Second Award of $1,500**

MI004 **Optimizing Energy Production through Waste Water Treatment: The Utilization of a Mediator-Less, Single Celled Microbial Fuel Cell**
Nurul MohdReza, 17, Union Colony Charter School, Greeley, Colorado

MI020 **Evolutionary and Ligand-binding Dynamics of ClfB and IsdA in Staphylococcal Species**
Amy Xu, 16, Jericho High School, Jericho, New York

MI054 **Bridging the Gap between *in vitro* and *in vivo***
Kevin James Cyr, 18, Clear Lake High School, Houston, Texas

MI056 **Testing Artificial Genes Designed to Inhibit the Growth of *E. coli* as an Alternative to Traditional Antibiotics**
Logan Thrasher Collins, 16, Fairview High School, Boulder, Colorado

**Third Award of $1,000**

MI007 **Advanced Design Field Combat and Burn Bandage using Antimicrobial Copper and Bio Inhibitor Film**
Summer Anne Monroe, 18, Polk State College Lakeland Collegiate High School, Lakeland, Florida

MI016 **Engineering a Novel Fusion Protein Therapy for Meningococcal Infection**
Rahi Dilip Punjabi, 16, Advanced Math and Science Academy Charter School, Marlborough, Massachusetts

MI021 **Morphogenesis of and Chromosome Segregation in *Escherichia coli* Branching Mutants**
Kaitavjeet Chowdhary, 17, Glastonbury High School, Glastonbury, Connecticut

MI033 **Autism and Gut Microbiome: Is There a Link?**
Kamran Jamil, 16, The Bishop's School, La Jolla, California

MI305 **Deletion of Endonuclease G Disrupts Mitochondrial Homeostasis and Leads to Reduced Virulence in the Human Protozoan Parasite *Leishmania mexicana***
Katie Anne Barufka, 18, Langley High School, McLean, Virginia
Neil Shivraj Davey, 17, Montgomery Blair High School, Silver Spring, Maryland

MI308 **Reinventing Antibiotics: A Study to Determine If the Addition of a Gram-Positive Lysin Can Prevent the Development of Resistance to Vancomycin and Daptomycin in MRSA**
Anna Elizabeth Blech, 16, Hunter College High School, New York, New York
Alexander Elias Epstein, 17, Hunter College High School, New York, New York

**Fourth Award of $500**

MI003 **Finding Novel Alginate Genes for the Better Management of *Pseudomonas aeruginosa* Infection in Cystic Fibrosis Patients**

Shiva Kangeyan, 16, Archimedean Upper Conservatory, Miami, Florida

MI006 **Contrary to the Text Book: Possible Sporulation and Identification of Mycobacteria Isolates from Pitcher Plants, Phase II**
Kendra Anastasia Pallin, 18, Cloquet Senior High School, Cloquet, Minnesota

MI008 **Investigating the Role of Heme Pocket Residues in a Globin Coupled Sensor**
William Huang Jin, 17, Gwinnett School of Mathematics, Science, and Technology, Lawrenceville, Georgia

MI030 **A Novel Pentameric Model of the T4 Bacteriophage Genome Packaging Motor and a Means of Disrupting Its Mechanism**
Raghu Vamsi Dhara, 17, Mission San Jose High School, Fremont, California

MI036 **Malathion as a Model Compound for the Degradation of the Nerve Agent VX**
Karthik Balaji Chakravarthy, 16, Beavercreek High School, Beavercreek, Ohio

MI044 **Rett Syndrome: Determining the Optimal Viral System for Gene Therapy**
Meera Radha Srinivasan, 15, Interlake High School, Bellevue, Washington

MI049 **Significantly Increasing the Concentration of Cellulosic Ethanol using *Cedecea davisae***
Abigail Lyn Walling, 16, Iowa City West High School, Iowa City, Iowa

MI302 **Establishing the Sensitivity & Reliability of Microbial Forensics**
Alexis Eleanor Nesbitt, 18, Rockdale Magnet School for Science and Technology, Conyers, Georgia
Ashley Danielle Driver, 18, Rockdale Magnet School for Science and Technology, Conyers, Georgia

# Physics and Astronomy

**Intel will present Best of Category Winners with a $5,000 award. Additionally, a $1,000 grant will be given to their school and the Intel ISEF affiliated fair they represent.**

**Intel ISEF Best of Category Award of $5,000**

PH011 **Cool Core Bias in Sunyaev-Zel'dovich Galaxy Cluster Surveys**
Henry Wanjune Lin, 17, Caddo Parish Magnet High School, Shreveport, Louisiana

**First Award of $3,000**

PH011 **Cool Core Bias in Sunyaev-Zel'dovich Galaxy Cluster Surveys**
Henry Wanjune Lin, 17, Caddo Parish Magnet High School, Shreveport, Louisiana

PH048 **Creating PEAS: Portable Elemental Analysis System - Developing and Implementing a Novel Cold Cathode Source**
Jennifer Ann Csele, 17, Notre Dame College School, Welland, Canada

**Second Award of $1,500**

PH008 **New and Improved Insights into the Microcosm: Multimodal Light Microscopy with Bright, Darkfield and Phase Contrast, Part 2: Axial Phase-Darkfield Contrast (APDC), Variable Phase-Brightfield Contrast (VPBC) and Universal Variable Bright-Darkfield Contrast (UVBDC)**
Timm Piper, 17, Martin-von-Cochem-Gymnasium, Cochem, Germany

PH022 **The Development of a Long Life Solid State Dye Laser**
Joseph Patrick Lee, 16, Saint Peter's Academy, New Market, Alabama

PH310 **The Sortation of Granular Materials through Forced Convection: Comparing Simulation and Experiment**
Seneca Jackson Velling, 17, Watchung Hills Regional High School, Warren, New Jersey
Zachary White Collins, 16, Watchung Hills Regional High School, Warren, New Jersey

PH311 **Investigation of Anisotropic Neutron Radiation from a Farnsworth IEC Fusion Reactor**
Jake Jordan Hecla, 18, Aviation High School, Des Moines, Washington
Raymond Aung Maung, 17, Kentwood Senior High School, Covington, Washington
Rian Naveen Chandra, 18, Capital High School, Olympia, Washington

**Third Award of $1,000**

PH003 **Farnsworth Fusor**
Michal Racko, 18, Jozef Lettrich Secondary Grammar School, Martin, Slovakia

PH024 **Superconductivity Enhanced by Chemical Disorder in BiS2-Based Oxides**
Coco Ying, 17, Taipei Jingwen High School, Taipei City, Chinese Taipei

PH027 **Focusing Sound Waves Using a Two-Dimensional Non-Linear System, Phase II**
Thorsen Michael Wehr, 16, Cedarcrest High School, Duvall, Washington

PH038 **Analysis of Jovian Decametric Emission using the Long Wavelength Array Station 1**
Jinhie Lee Skarda, 18, Montgomery Blair High School, Silver Spring, Maryland

PH045 **Let There Be Light!... Fully Solution-Processed Polymer-based Aluminum Substrate Photovoltaic Cells Fabricated in Ambient Air**
Faizullah Mashriqi, 17, Francis Lewis High School, Fresh Meadows, New York

PH056 **N-Body Simulation of Saturn's Ring Structure**
Coleman J. Kendrick, 14, Los Alamos High School, Los Alamos, New Mexico

**Fourth Award of $500**

PH012 **Superconductivity Emerging from Diamagnetism and Non-Fermi Liquid Behavior in a New Class of Chalcogenides**
Vincent Shian Cao, 17, Paul Laurence Dunbar High School, Lexington, Kentucky

PH035 **Laser-induced Propulsion of Anticancer-Doxorubicin Using Low-Power Laser Optical Tweezing**
Rebecca Michelle Murray, 16, Greenwich High School, Greenwich, Connecticut

PH036 **Method for Mass Estimation of the Higgs Particle in the Decay Higgs->tau tau**
Noam Ottolenghi, 17, Yachad Modi'in High School, Modi'in, Israel

PH040 **Photometric Evidence of Changes in Pulsation Characteristics of Hot Subdwarf B Stars**
Arjun Raghavan, 17, Chapel Hill High School, Chapel Hill, North Carolina

PH043 **Geometric Bore Variations and Their Harmonic Nuances in Musical Instruments**
Harrison Robert Pershing, 15, Greely High School, Cumberland, Maine

PH044 **Qubit Rotator: A Nanowire Device for Rotation and Readout of Flying Electron Spin Qubits at Room Temperature for Quantum Computing**
Saumil Bandyopadhyay, 18, Maggie L. Walker Governor's School for Government and International Studies, Richmond, Virginia

PH301 **Formation and Characterization of Homogeneous and Highly Stable Soap Bubbles**
Quentin Phillippe Poussier, 17, Lycee Douanier Rousseau, Laval, France
Alexandre Barbin, 17, Lycee Douanier Rousseau, Laval, France
Ewen Queffelec, 17, Lycee Douanier Rousseau, Laval, France

PH304 **Research on Optimal Vortex Rings and Its Applications**
Woo Heon Ha, 18, Jin Ju Jeil Girl's High School, Jinju, South Korea
Ah Hyeon Kim, 17, Jin Ju Jeil Girl's High School, JinJu, South Korea
Jin Ju Choi, 18, Jin Ju Jeil Girl's High School, Jinju, South Korea

PH305 **The Study on the Effective Chipping Shape of Handaxe by Analyzing Physical Fracture Characteristics**
Mi Rim Choi, 15, Boyoung Girl's High School, Dongdocheon, South Korea
Ha Young Yun, 16, Boyoung Girl's High School, Dongdocheon, South Korea
Oh Reum Cha, 17, Boyoung Girl's High School, Dongdocheon, South Korea

# Plant Sciences

**Intel will present Best of Category Winners with a $5,000 award. Additionally, a $1,000 grant will be given to their school and the Intel ISEF affiliated fair they represent.**

**Intel ISEF Best of Category Award of $5,000**

PS307 **The Characterization of the LPS-Induced Hypersensitive Response in *Ceratopteris richardii***
Ryan M. Kenny, 16, George W. Hewlett High School, Hewlett, New York
Samantha Hayley DiSalvo, 16, George W. Hewlett High School, Hewlett, New York
Amy Jaclyn Vitha, 16, George W. Hewlett High School, Hewlett, New York

**First Award of $3,000**

PS040 **The Usage of Polyphenol and Spinosad Compounds as Biopesticides**
Dre Erik Howard Steinwehr, 17, Hankinson High School, Hankinson, North Dakota

PS307 **The Characterization of the LPS-Induced Hypersensitive Response in *Ceratopteris richardii***
Ryan M. Kenny, 16, George W. Hewlett High School, Hewlett, New York
Samantha Hayley DiSalvo, 16, George W. Hewlett High School, Hewlett, New York
Amy Jaclyn Vitha, 16, George W. Hewlett High School, Hewlett, New York

Second Award of $1,500

PS008 **Isolation of Leukemia-Specific Cytotoxic Compounds from Lemon Balm (*Melissa officinalis*)**
Reid Toshio Kealii Akana, 16, Kamehameha Schools Kapalama High School, Hawaii, Hawaii

PS032 **The Role of Fatty Acid and Retinol Binding Proteins (FARs) During Host Parasitism by RKN *Meloidogyne javanica***
Kalia Deborah Firester, 15, Hunter College High School, New York, New York

PS034 **Meeting the Future Demands of World Crop Consumption: A Novel Construction Method for the Generation of dTALE Constructs for Genome Engineering Applications**
Abdullah Hassan Bu Khamsin, 17, Dhahran Ahliyya School, Dammam, Saudi Arabia

Third Award of $1,000

PS006 **Building New Agrobacterium Strains for High Efficiency Transformation of Plants**
Aditi Das, 16, Roseville Area High School, Roseville, Minnesota

PS010 **Sugarbeet Immunizations: Does It Work with Rhizoctonia? Phase Two: Proof in the Field**
Amy Kaitlyn Anfinrud, 16, Park Christian School, Moorhead, North Dakota

PS013 **Genetic Engineering: Improving Drought Resistance by Identifying the Underlying Mechanisms of Mitogen-Activated Protein Kinase 4 and Its Interaction with Substrate MKS1 in *Brassica napus***
Michelle Man-si Chin, 17, West Shore Junior/Senior High School, Melbourne, Florida

PS302 **Biological Activity and Phytochemical Approach of the Medicinal Plant *Arrabidaea chica***
Cristopher Mateus Carvalho, 15, Escola Estadual Manoel Antonio de Sousa, Mateus Leme, Brasil
Jaqueline Campos Costa, 16, Escola Estadual Manoel Antonio de Sousa, Mateus Leme, Brasil
Julia Maria Resende Ferreira, 15, Escola Estadual Manoel Antonio de Sousa, Mateus Leme, Brasil

PS309 **Evaluating the Presence of Peronospora in the Salinas Valley and Analyzing the DNA Sequence Similarity in Downy Mildew Pathogens Affecting Spinach and Beet in California**
Aradhana Sinha, 16, Salinas High School, Salinas, California
Kapil Sinha, 13, Salinas High School, Salinas, California

Fourth Award of $500

PS009 ***Impatiens balsamina* Leaf Extract as Potential Fungicide Against *Fusarium oxysporum f. sp. cubense* Tropical Race 4 Causing Fusarium Wilt of Banana**
Judel Jay Angelia Tabsing, 16, Panabo National High School, Panabo City, Philippines

PS025 **Flax Seed Biodiesel, Phase III: Preliminary Economic Evaluation**
Taylor John Schroeder, 17, Fairfield Public School District #21, Fairfield, Montana

PS038 **The Threshold of $CO_2$ Fertilization Effect on the Growth of *Triticum aestivum***
Jessica Chen Xu, 15, High Technology High School, Lincroft, New Jersey

PS042 **Analysis of CRT1 Protein Family Dimerization in Plant Immune Responses**
Chamath Sameera Dharmasiri, 15, Wimberley High School, Wimberley, Texas

PS044 **Reprocessing Components of Milk from Foliar Application to Augment Protein Synthesis in *Triticum aestivum***

Jordan Ray Cadle, 18, Paoli Junior/Senior High School, Paoli, Indiana

PS304 **Growth of *Triticum aestivum* in Response to ZnO Nanoparticles in Soil**

Jean-Luc Christopher Watson, 17, Logan High School, Logan, Utah
Tommy Fang, 17, Logan High School, Logan, Utah

PS315 **Factors Affecting the Response of Venus Flytrap**

Sahakrit Tanikawong, 16, Bangkok Christian College, Bangkok, Thailand
Pornpawit Jenjirawong, 16, Bangkok Christian College, Bangkok, Thailand
Nadtanon Pongdee, 16, Bangkok Christian College, Bangkok, Thailand