FOR RELEASE

Calgary youth sweep major honours at Canada-Wide Science Fair; Fort McMurray also wins Youth Can Innovate Award

REGINA, SK (Friday May 19, 2017) – Four finalists from the Calgary and Fort McMurray Regional Science Fairs earned more than $14,000 in national cash prizes, medals, and two of the three Grand Awards, including the best project of the entire fair, for their year-long efforts to investigate societal problems and develop innovative solutions through Science, Technology, Engineering, and Mathematics (STEM) at the 56th Canada-Wide Science Fair, held this year on the University of Regina campus. They are winners of *Youth Can Innovate* Awards, sponsored by the Calgary-based Gwyn Morgan & Patricia Trottier Foundation.

"One of the key goals of our Foundation is to encourage and support Canadian students in STEM," said Gwyn Morgan in announcing the inaugural winners of the 2017 Awards. "We want to champion Canada's young innovators and shine a light on their work by encouraging them and providing financial support. They're Canada's future," said Patricia Trottier. More than 440 STEM students from schools across Canada presented 390 projects.

The four Albertans winning *Youth Can Innovate* Awards are:

Calgary
Sir Winston Churchill Grade 11 student Tim Wu, 16, always had an enormous interest in biology and chemistry and this year his ingenuity earned him an $8,000 *Youth Can Innovate* Award in his first appearance at the national fair.

"The use of solar cells is becoming increasingly prevalent and I decided to investigate existing flaws within new and old photovoltaics as part of my long-term career desire in the world of organic chemistry to continue the development of third-generation solar cells. While common solar cells are monocrystalline silicon, organic solar cells (OSC) can provide benefits such as low manufacturing or processing costs. I feel the instability of organic polymers is vastly understudied and has yet to be fully addressed" said Wu. He identified that photodegradation, which is the breakdown resulting from exposure to high energy (ultraviolet) light, is the major cause of OSC instability, yet the effects can be negated using eggshells as a cheap and effective UV absorber.

UV absorbers absorb UV light before they come into contact with the organic polymers. Wu realized that eggshells serve a biological purpose of protecting the fragile embryo from external factors including UV light. Therefore, the use of eggshells in OSCs could serve the same function of protecting the solar cell. Wu explored the use of an eggshell suspension with results comparable to market standard absorbers such as titanium dioxide or benzophenone; however, waste eggshells are significantly cheaper. The eggshell protected samples showed an almost 500% improvement in absorption compared to unprotected samples. "With the world increasingly looking towards solar energy as the next generation of renewable energies, it is crucial that the operational flaws within new technologies such as organic solar cells be addressed," said Wu.

Wu is president of Sir Winston Churchill's Chemistry Club, and recently returned from the Harvard World Schools Invitational Debate Tournament over spring break. He is also the co-founder of a non-profit, student run initiative that connects high school students with the opportunity of working in a university-level laboratory.

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Colette Benko, a Grade 11 student from St. Mary's High School, added a $1,000 *Youth Can Innovate* Senior Award to her Gold Medal and recognition as Best Project of the entire fair for her novel approach to pediatric cancer therapy. Benko targeted epigenetics to induce differentiation – the cellular process of specializing and maturing – by investigating an enhancer of Zeste Homolog 2 (EZH2). Inducing differentiation in neuroblastoma cells (actively dividing neurons) allows for better treatment outcomes and a lower chance of relapse in patients. This inhibitor shows promise as a new therapeutic agent for treating neuroblastoma.

Benko also showed that the drug 3 Deazaneplanocin A is an efficient differentiation agent, and has the potential to be used in clinical oncology. This could increase the chance of survival for primary and relapse patients, while preventing chances of further relapse. Benko has always had a passion for science, and science fairs have allowed her to develop this interest by enabling her to become more involved in her field.

Grade 10 student Crystal K. Radinski of Webber Academy, focused her attention on finding an EEG biomarker for Alzheimer's Disease, and has been recognized with a $750 Youth Can Innovate Intermediate Award to complement her Gold Medal. She notes that improving the accuracy and reducing the time needed to diagnose Alzheimer's disease could enable timely interventions, treatments, and cost reduction. Crystal's study explored the pathophysiology of dementia to develop an objective instrumental method for diagnosing the disease.

"If the disconnection of synapses between nerve cells is responsible for the failure of the brain to integrate various regions into effective networks, then the electroencephalographic (EEG) evidence of the disruption could be used to diagnose Alzheimer's dementia," she explained. Radinski identified the EEG as a biomarker of neurodegenerative dementia and evaluated it as a diagnostic method. Discovering specific EEG markers could have a significant impact on the way dementias are screened and diagnosed, for example, distinguishing delirium from dementia is very important as hypoactive delirium can mimic dementia. Her method can also facilitate testing of patients unable to undergo lengthy neuropsychological evaluations.

Radinski's project was inspired by the needs of the growing population of seniors in Canada. This is the fifth year she has participated in a science fair.

Fort McMurray

Dhrumil Shah, 17 from Westwood High School, also received a $1,000 Youth Can Innovate Senior Award and a Silver Medal for his work on enhancing electrolysis. "Hydrogen has been called the energy carrier of the future, and can be produced in a clean manner using electrolysis… which can also provide simple access to energy in developing countries. Unfortunately, electrolysis is not widely used due to its high inefficiency and economic infeasibility" said Shah.

Shah recognized that a lot of current efforts to improve electrolysis efficiency are focused on the electrode and design of the electrolyzer. He investigated the effects of electrical input and its influence on the mechanism by which electrolysis is carried out. "In my study, inductive reactive voltage pulses were supplied to an electrolyzer in an effort to observe the behaviour of the electric double layer interface and separate the faradic (asymmetric alternating) currents for the first time ever in electrolysis," he explained. In conventional DC (direct current) electrolysis, hydrogen production occurs as long as external electricity is applied. However, in Shah's innovative and ground-breaking design, external energy is applied for a relatively short period of time in the form of an inductive reactive pulse. This "charging" of the cell is followed by a slow discharging, which is what drives the actual process of electrolysis. This results in hydrogen production without the need of a constant external energy source. Shah went on to identify that bubbles in solution and on the electrode, can affect efficiency as they result in overpotential (additional energy required for hydrogen production). Shah minimized the effects of bubble overpotential by applying an ultrasonic field. The efficiency of this innovative design was measured to be 97%, which had never been achieved, according to his extensive scientific literature search.

"I strongly believe that the single most prominent issue on our planet is energy poverty. With cheap and abundant energy, we can solve hunger using optimized greenhouses and better farming; and we can solve water shortage by using cost-effective desalination systems. Hydrogen has the potential to be the solution to this issue, as it really is a 'fuel of the future. I'm extremely passionate about my research," he concludes. This was Shah's third appearance as a national finalist.

Youth Can Innovate Awards, with a total cash value of $41,000, are offered to students competing at Canada's annual national science fair. This year, 242 finalists at the junior, intermediate and senior levels nominated their projects for evaluation. The 2017 recipients were selected by Canada-Wide Science Fair judges. More information about *Youth Can Innovate* and profiles of 2017 recipients, can be found at Facebook/YouthCanInnovate, Twitter: @youthcaninnovate, and www.youthcaninnovate.ca.

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For media information, photos, and to interview winners: Rosemarie Enslin (403) 630-8421, enslin@enslinpr.com. @RosemariePRyycT

About The Gwyn Morgan & Patricia Trottier Foundation: The Gwyn Morgan & Patricia Trottier Foundation is a family foundation based in Calgary, Alberta. Established in 2005, it focuses on education, wellness initiatives and leadership development. In education, the Foundation gives priority to initiatives that encourage and support students pursuing STEM (Science, Technology, Engineering, and Mathematics) careers. The Foundation's STEM support currently includes 20 recently established *Youth Can Innovate* Awards, which are given annually to 16 innovative projects at the Canada-Wide Science Fair; Camosun College's Empowering Women In Trades Program; the Gwyn Morgan **Be An Engineer** bursaries awarded annually at 15 Canadian universities and the Gwyn Morgan Centennial Bursary.