

Background Information on Regeneron ISEF 2023

There are 21 scientific categories in Regeneron ISEF 2023. Within each category, awards were presented to the top four projects. In addition, the ISEF Special Awards were presented by various supporting organisations that represent a wide variety of scientific disciplines. For more information on the Regeneron ISEF, please refer to: <https://www.societyforscience.org/isef/>

Details of projects submitted by the Singapore team

S/N	Students	Project description and Team's Insights
1.	<p>School: Chung Cheng High School (Yishun)</p> <p>Name: Ang Shi Qi Georia (洪詩淇) Level: Sec 4 Language Proficiency: English, Mandarin</p> <p>Name: Tricia Tan Hui Xin (陈慧欣) Level: Sec 4 Language Proficiency: English, Mandarin</p>	<p>Laser Tuned Micro-fluorescence in Fish Scales for Steganography and Chemical Sensing</p> <p>Georia and Tricia found that they could use lasers to enhance the unique properties (fluorescence and adsorption) of fish scales, turning them into a detector for water pollutants. They also discovered that by lasering fish scales, they could sear (or conceal) messages onto fish scales that will only show up under fluorescence. Their research shows the potential of repurposing fish scale waste into a functional and sustainable material. With their research, they developed a low-cost and portable detector for water pollutants.</p> <p>From their research journey and experience at ISEF 2023, they understood the importance of passion in scientific research along with communication skills to best deliver their findings. They are grateful for this opportunity and are thankful to their mentors who have guided them along their journey.</p>
2.	School: Raffles Institution	Sign2Speak! Synthesising Emotional Speech from Sign Language

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	<p>Name: Mirdhini Shri Rajaram (மிர்தினி ஷ்ரி ராஜாராம்) Level: IP Year 6 Language Proficiency: English, Tamil</p> <p>Name: Ong Yu Xi (王宇希) Level: IP Year 6 Language Proficiency: English, Mandarin</p>	<p>through Deep Learning</p> <p>Emotions are key in authentic human interactions. Mirdhini and Yu Xi's project, Sign2Speak, developed a software application that translates sign language into emotional speech. Sign2Speak can assist sign language users to communicate expressively with people who do not use sign language.</p> <p>They are immensely grateful for this opportunity to present their work on an international stage. Through exposure to different aspects of STEM, Regeneron ISEF was truly a fruitful experience for them to connect with like-minded individuals.</p>
3.	<p>School: Dunman High School</p> <p>Name: Jamie Wen (温杰铭) Level: IP Year 5 Language Proficiency: English, Mandarin</p>	<p>Doctor Bartender: Phage Cocktails to Treat Multi-drug Resistant Mycobacterium abscessus</p> <p>Antibiotic resistance is projected to overtake cancer deaths by 2050. Jamie's project aimed to better treat serious antibiotic resistant bacterial infections with a mixture of phages (bacteria killing viruses) and antibiotic cocktail. His findings suggested that these cocktails outperformed current antibiotics, and can be a potential treatment for multi-drug resistant bacterial infections.</p> <p>ISEF 2023 was an extremely enriching experience that allowed Jamie to engage in eye-opening cross-cultural interactions with delegates of many countries. Beyond the experiences and knowledge he gained, the friendships forged was even more valuable. He is grateful for this opportunity, and for the support provided by his teachers, mentors, friends and family.</p>
4.	School: NUS High School of Mathematics	Perfectly Flawed: Leveraging on Defects in AgSbTe₂ via Ge Doping for

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	<p>and Science</p> <p>Name: Ivan Joel You Wen Jie (游文杰) Level: IP Year 5 Language Proficiency: English</p>	<p>Thermoelectric Waste Heat Harvesting</p> <p>Thermoelectrics have the ability to convert heat into electricity, making it useful for converting waste heat emitted from our everyday processes into useful energy. One such thermoelectric material is AgSbTe₂. In Ivan's project, he found that doping germanium into AgSbTe₂ enhanced its efficiency. This revealed the potential of AgSbTe₂ as a thermoelectric material, allowing it to have many prospects in combating global warming.</p> <p>At ISEF 2023, Ivan had the opportunity to learn and gain deeper knowledge from experts. He is grateful for the exposure and would like to thank everyone that made his research journey meaningful.</p>
5.	<p>School: Hwa Chong Institution</p> <p>Name: Bai Ruotong (白若桐) Level: IP Year 6 Language Proficiency: English, Mandarin</p>	<p>Computational Discovery of Highly Sustainable and Efficient Metal-Organic Frameworks for SO₂ Capture</p> <p>Ruotong's project aims to use a computational approach to discover high-performance Metal-Organic Frameworks (MOFs) that specifically bind SO₂. SO₂ is an air pollutant that poses significant threats to health and the environment. Her project accelerates the critical search for high-performing MOFs for SO₂ capture, thereby offering tremendous potential for environmental remediation.</p> <p>ISEF was an eye-opening and transformative experience. She believes the most valuable part of ISEF lie in the journey and process it offers – from learning about other delegates' remarkable projects to learning about their cultures. Moreover, attending the Women in STEM panel and seeing females excel in the field was tremendously empowering.</p>

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6.	<p>School: Hwa Chong Institution</p> <p>Name: Li XinRui (李昕睿)</p> <p>Level: IP Year 6</p> <p>Language Proficiency: English, Mandarin</p>	<p>Gyro-Ring: Dynamics and Steady Precession of Ring on a Vertical Smooth Rod</p> <p>When you spin a ring on a smooth vertical rod, the ring may slowly spiral down the rod instead of simply sliding down. XinRui's project aims to study this gravity-defying phenomenon. As centrifuges are typically expensive, his findings show potential for developing a low-cost centrifuge that can be powered by hand as the ring can spin very fast during its motion.</p> <p>XinRui is glad to have met many like-minded individuals with great and diverse personalities at ISEF 2023. The friendships forged from this competition have made the experience of participating in ISEF even more enriching and meaningful for XinRui.</p>