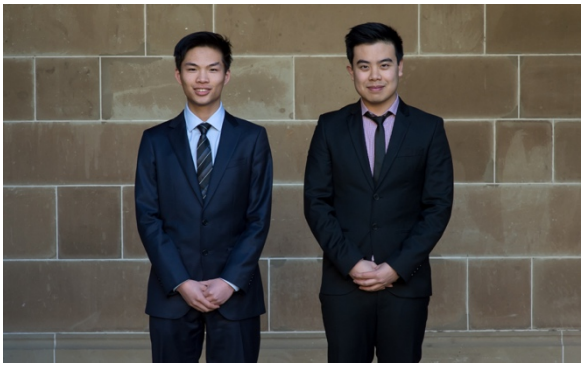
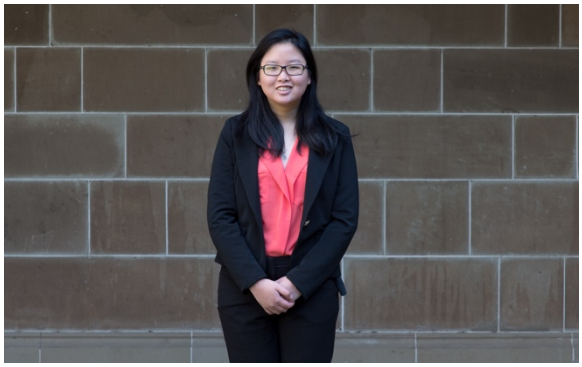
Chemical Engineering:

<table>
<tr><th colspan="2">Enzyme Biomimicry</th></tr>
<tr><td>  </td><td>Matthew Lam, Kevin Ngov
Enzymes are the key to many biochemical reactions. Their unrivalled catalytic ability has seen them employed commercially in many products, such as washing detergents, biofuel synthesis, alcohol production and the synthesis of drugs. However, the full potential of enzymes in industry settings has been limited by their restricted operating conditions, low stability and high cost. This research project aims to synthesise and evaluate a new class of industrial catalysts that removes the limitations associated with the use of natural enzymes. This is achieved by mimicking the functional groups that form the active site of hydrolytic enzymes</td></tr>
<tr><th colspan="2">Scale Up of Microbubble Generation</th></tr>
<tr><td>  </td><td>Yiwei Liu
Microbubbles are widely used in both industrial and domestic fields, such as wastewater treatment and biofuel generation. Compared with normal sized bubbles, microbubbles can provide better surface and volume ratio to allow more complete mass transfer in solutions. However, generating microbubbles is a very energy inefficient procedure. In order to reduce the energy consumption of microbubble generation, this project focuses on an oscillation microbubble generator, which uses oscillated air pulse to create microbubble from a diffuser under water. The project will be developed by exploring the relationship between the oscillation frequency, air flow rate and water depth’s effect on the microbubble generation, to find the most energy efficient combination.</td></tr>
<tr><th colspan="2">Defluoridation of Waste Water by Capacitive Deionisation</th></tr>
<tr><td>  </td><td>Irene Chandra
Removing fluoride ions from drinking water is essential to preventing health issues related to excessive fluoride intake. Adsorption is often used as a removal method by attracting Fluoride ions in the solution onto a surface. However, the common practice of using acid/base washing in regeneration process leads to the production of secondary waste. This project focused on electrosorption of Fluoride ions from water using Titanium-loaded Graphene. Positive charge is loaded onto the Titanium-loaded Graphene surface to better attract the negative Fluoride ions, while negative charge aids the release of Fluoride ions in the regeneration process, eliminating the washing process.</td></tr>
<tr><th colspan="2">Wastewater Pumping Optimisation at High Solid Concentration</th></tr>
<tr><td>  </td><td>Yi Li
The Western Wastewater Treatment Plant is constructing a new “Dry Stacking” to dry and store wastewater sludge. Sludge behaves as a non-Newtonian fluid. The sludge with higher solid content is preferred as it requires less drying time and easily sticks on the drying beds. However, the main issue is pumping high solid concentration sludge. When the sludge is too thick, the pressure drop along the pipe will be too large. When the pressure drop exceeds the pressure limit, it can cause utility damage. The main objective of this project is to predict the pressure drop to assist the operator in determining the best concentration of sludge.</td></tr>
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