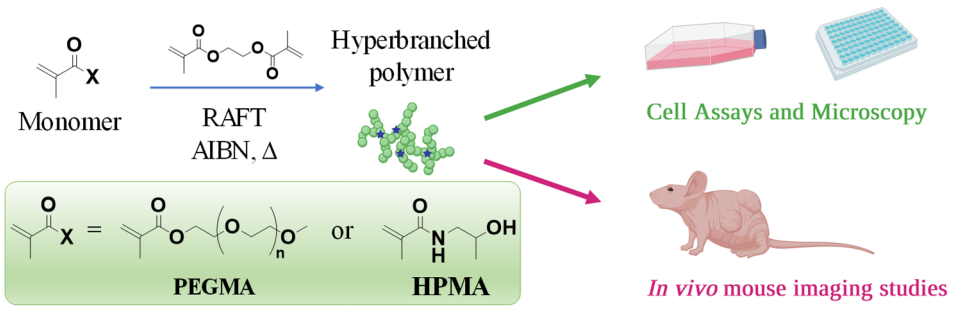
2024 Summer Research Project

Project title:	**Modulating Hyperbranched Polymer Structures for use as Personalised Nanomedicines in cancer diagnosis and treatment**
Project duration, hours of engagement & delivery mode	Duration of the project, 6-10 weeks over Summer Vacation. Hours of engagement must be between 20-36hrs per week on-site
Description:	 Personalised nanomedicines have become more attainable through the development of a range of factors, one of which is the adaptability of the nanomaterials used for their construction. The nanomaterial that is displaying increased translatability in this field is the hyperbranched polymer - a structure capable of modulating its size and functionality via thoughtful manipulation of the polymerisation mechanism. However, modulation of these structures has not been fully explored, and more experimental analysis is required to determine the optimum parameters to achieve targets such as number of arms per particle while attaining the desired polymer chain length. This research project will involve the synthesis, characterisation and assessment of a range of hyperbranched polymers that will vary in their polymer chain length, crosslinking density, and the type of hydrophilic monomer used. The comprehensive analysis of nanomaterials based on these variables will elucidate discernible patterns governing the formation of nanoparticles during the polymerisation. These insights will subsequently cast light on critical physical attributes, foremost among them being particle size. This data will enable appropriate experimental setups in the future to target specific particle sizes and chain end densities based on the desired hydrophilic material required. These water soluble nanocarriers that we develop would be capable of prolonged blood circulation, thereby ensuring effective pharmacokinetics to enable cell receptor targeting of therapeutics at sufficiently high concentrations.
Expected outcomes and deliverables:	Applicants will gain experience in the latest polymer synthetic techniques and strategies, as well as experience in post-polymerisation chemistries and imaging experiments. There is the potential to generate publications from this research, and the student will be asked to present an oral presentation to the Thurecht group at the end of their project.

Suitable for:	This project is open to applications from 2nd year and later undergraduate students with a background in chemistry and biotechnology.
Primary Supervisor:	Dr Craig Bell
Further info:	For further information, potential candidates can contact Dr Bell (c.bell1@uq.edu.au) or Prof Thurecht (k.thurecht@uq.edu.au). Interested students must get in contact for discussions about the project and research dates prior to submitting an application.