Faculty of Engineering
Summer Research Program 2022-2023

Project Title: Sustainable Polymers from Amino Acids

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Objective

- Prepare a range of polypeptides by the polycondensation of a range of natural and non-natural amino acids.

- Characterize the resulting materials using spectroscopic and thermo-mechanical methods.

- Evaluate the barrier properties and degradability of the prepared materials

Project Details

Single-use plastics cause environmental pollution and create a range of health impacts to both humans and wildlife. Yet, as materials, they are truly remarkable. They are able to protect their contents from mechanical damage and the degradative effects of oxygen and moisture, while also minimising the overall weight of the packaged product and therefore limiting transport costs and associated environmental impact, and at a very low cost to produce. This project seeks to develop alternative plastic packaging materials by the direct polymerization of amino acids. Polymers from amino acids are potentially attractive as packaging materials due to their biological origin and inherent biodegradability, but a process for their manufacture is lacking and their barrier properties need to be established. Taking inspiration from the industrial production of Nylon-6,6 you will explore the melt polycondensation of a range of natural and non-natural amino acids, and will undertake characterization of the resulting polymeric products (including for example FTIR and NMR spectroscopies, SEC, DSC and tensile testing). Promising products will also be tested for their moisture and oxygen barrier properties, and degradation under accelerated conditions.

Prerequisites
None

Additional Information
Informal enquiries can be made to neil.cameron@monash.edu
Submit as a word document - no more than one page long.