NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE | Graduate College

Joint Projects

NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE | Graduate College

1. Developing novel antimicrobial peptides for skin wound applications

Date Posted	31 March 2025	
Home University	Nanyang Technological University	
Partner University	Indian Institute of Science, Bangalore	
Supervisors	**Home**	**Home**
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Project Description (200-300 words)	The goal of this interdisciplinary joint project is to develop novel safe and potent antimicrobial peptides for applications in skin wounds. In aim 1, the student will design and synthesize antimicrobial peptides incorporating 2,4-diaminobutyric acid (DAB) and 2,3-diaminopropionic acid (DAP) in place of lysine, combined with other canonical and non-canonical amino acids. In aim 2, the student will determine the antimicrobial efficacy of the designed peptides against a broad spectrum of gram-positive and gram-negative bacterial strains, including multi-drug resistant species. In aim 3, the thesis will assess the stability, protease resistance, and cytotoxicity of the peptides to ensure potential therapeutic applications. Finally aim 4 will elucidate the mechanism of action of these peptides by studying their interactions with bacterial membranes using various biophysical techniques and test the efficacy of these novel peptides in improving healing of skin wounds.	
Program/Center Website(s)	NA	
Additional Information (e.g., files with project details)	NA	

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2. Reconstructing carbon biogeochemistry of Southeast Asian coastal waters using coral cores

Date Posted	11 March 2025	
Home University	Nanyang Technological University	
Partner University	Indian Institute of Science, Bangalore	
Supervisors	**Home**	**Partner**
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Project Description (200-300 words)	Southeast Asia's Sunda Shelf Sea receives some of the world's highest rates of organic carbon input from land, chiefly from blackwater rivers that drain the region's extensive tropical peatlands. Previous research has shown that this terrestrial organic carbon (tOC) has two major environmental impacts: firstly, it absorbs sunlight and thereby reduces the light availability for marine organisms such as corals and phytoplankton. Secondly, a large fraction of the tOC decomposes to CO2 within the shelf sea, thereby acidifying the seawater. The input and decomposition of tOC is thus a major control over the regional marine ecology of Southeast Asia. A key question that remains unresolved is how the tOC input has changed over the last half century: during this time, most of the peatlands in Southeast Asia have been drained and converted to plantations. Site-scale studies suggest that this has considerably increased the tOC outflow via rivers to sea, but we have virtually no historical ocean chemistry data to test whether this really is the case and how it has affected marine ecosystems. This PhD project will use geochemical proxy measurements in coral skeleton cores collected along the Malacca Strait to provide the first long-term reconstruction of tOC inputs into coastal waters and identify their drivers. We will use multiple proxies, including coral luminescence (proxy for tOC concentration), boron isotopes (proxy for pH), and stable carbon and oxygen isotopes (proxies for tOC decomposition and for salinity) to produce a comprehensive understanding of the coastal carbon cycle and how this has affected rates of seawater acidification and underwater light availability. The student will learn how to collect and sample coral skeleton cores, how to measure each of the geochemical proxies, and how to calibrate coral core proxy data using direct measurements of seawater chemistry. Boron isotopes will be analysed at IISc.	
Program/Center Website(s)	NA	
Additional Information (e.g., files with project details)	NA	