

2019/20 PhD Proposal – CSC-NZ-CFPN CRCC Joint Funding Programme

Information to be published on NZ-CFPN CRCC website if proposal is selected	
Project title	Fate of zein-based nanopesticides in the environment.
Supervisor title and name	Melanie Kah, PhD. Senior Lecturer
Department	Faculty of Science
School / Centre	School of Environment
University	University of Auckland
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Link to Supervisor's research page	http://www.science.auckland.ac.nz/people/profile/melanie-kah
Project outline 150-300 words (approx) describing a possible PhD project, which has a link with an existing or potential research partner in China	Engineered nanoparticles (ENPs) exhibit great potential as effective, value-added delivery systems for agricultural applications. Novel nano-enabled pesticides and fertilisers have the potential to significantly reduce the environmental footprint of current agriculture. However, there are concerns over ENPs' safety as knowledge is currently lacking with respect to the fate of ENPs after their application in the field. This project will focus on a novel pesticide nano-delivery system based on zein, a protein derived from corn and that has been used for food applications in the past. The goal will be to study the processes leading to the transformation and transport of zein nanoparticles in the environment. Systematic laboratory experiments will allow understanding how fate processes are influenced by the properties of the nanoparticles (e.g. size, surface charge) and the properties of the environment (soil properties, light, temperature). Skills required: background in environmental science and/or chemistry, attention to details and reliability, interest in colloidal/nano chemistry and analytical techniques (including spectroscopy).
References for further reading (optional)	M Kah, N Tufenkji, JC White. Nano-enabled strategies to enhance crop nutrition and protection. Nature nanotechnology 14 (6), 532 M Kah, RS Kookana, A Gogos, TD Bucheli. A critical evaluation of nanopesticides and nanofertilizers against their conventional analogues. Nature nanotechnology 13 (8), 677
Additional information to be used in proposal selection process	
NZCFPN CRCC priority area to which proposal is aligned (see list below)	<ul style="list-style-type: none"> Risk assessment and mitigation
Brief outline of Supervisor's current research links with China or interest in developing them	I started collaborating on the applications of nanotechnology in agriculture with Associate Prof. Dr. Lingxiangyu Li, Email: lingxiangyu.li@zstu.edu.cn , Environmental NanoChemistry Group Department of Chemistry, Zhejiang Sci-Tech University. Research and Development activities on the topic are intensifying in China and New Zealand. Establishing interdisciplinary and international collaborations is key to achieving the full potential of the technology and improve the sustainability of agriculture at the global scale.