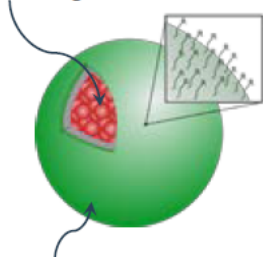


# Encapsulation technology: targeted foliar delivery

## PHYSICAL SCIENCES: Processing

The Challenge	<p>Key issues with current agrichemicals include:</p> <ul style="list-style-type: none"> <li>• over-use to achieve effective concentrations in plants, taking into account spray and dusting delivery</li> <li>• run-off costs to the farm and the environment</li> <li>• the cost of goods for high value specialty products.</li> </ul>
The Solution	<p>Monash has developed a directed delivery system that targets leaves and can be used to deliver specific protected payloads such as pesticides, insecticides, fungicides or nutrients directly to plants.</p>
Key benefits	<ul style="list-style-type: none"> <li>• Targeted delivery to leaves</li> <li>• Improved delivery</li> <li>• Controlled release</li> <li>• Reduced wastage and overspray</li> <li>• Decreased run-off pollution</li> <li>• Decreased intensity of use</li> <li>• Less use and decreased COGS</li> </ul>
Development Stage	Proof of Concept
Brief Description & Differentiation	<ul style="list-style-type: none"> <li>• Functionalized encapsulation of specialty agricultural chemicals with a targeted release.</li> <li>• Strong outer shell remains intact until triggered to release the payload.</li> <li>• Can be functionalized to adhere to plant cuticle wax, triggering targeted delivery of the payload into the leaf rather than to roots or soil, through a broadly applicable, yet strong and stable interaction.</li> <li>• Encapsulation technology increases the accuracy of desired chemical deployment; release can occur slowly to provide sustained action or can be triggered to provide a burst in response to external stimuli such as water, pH, CO<sub>2</sub>, or salt (Figure 2).</li> <li>• Technology is based on materials commonly used in agricultural contexts that are known to biodegrade.</li> </ul> <p>The research team have the expertise to modify this technology for the delivery of a number of specialty chemicals for agricultural use. They have used fungicide as a demonstration but can be used for delivery of a broad range of agricultural products including:</p> <ul style="list-style-type: none"> <li>• Fungicides; Insecticides; Pesticides, and Nutrients</li> </ul>
Research Team	Led by A/Prof Rico Tabor (ARC Future Fellow, School of Chemistry)
Intellectual Property	PCT application filed

Core: fungicide-saturated co-polymer phase



Shell: Hydrophobic coating adheres to waxy leaf

Figure 1(a): Our encapsulation technology

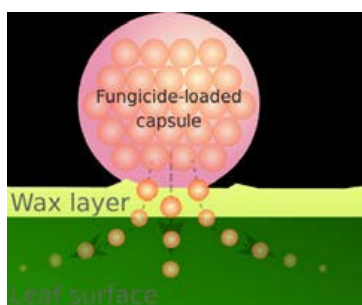


Figure 1(b): Binding of the capsule and release

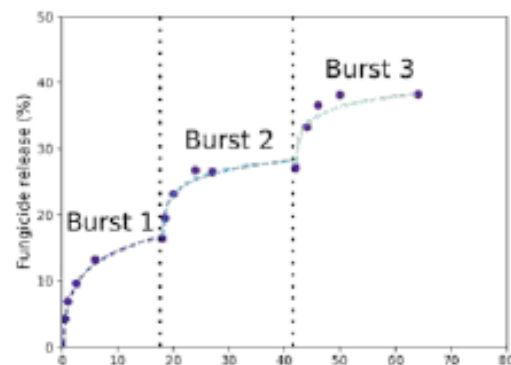


Figure 2: Multiple release bursts in response to stimuli