

## TECH OFFER

### Biodegradable, Organic Solvent-Free Nanoencapsulation Of Hydrophobic Actives



## KEY INFORMATION

TECHNOLOGY CATEGORY:

Chemicals - Bio

Chemicals - Polymers

Healthcare - Pharmaceuticals & Therapeutics

Personal Care - Cosmetics & Hair

Personal Care - Fragrances

TECHNOLOGY READINESS LEVEL (TRL): **TRL7**

COUNTRY: **SINGAPORE**

ID NUMBER: **TO174665**

## OVERVIEW

Many active ingredients in formulated products often suffer from degradation triggered by light, heat, mechanical stress or volatile loss, as well as incompatibility issues with other ingredients or excipients. Encapsulation of actives could be a solution, however existing methods including nanoemulsion, liposomes, nanostructured lipids, spray drying involve undesirable steps that use organic solvents, surfactants, alcohols, non-biodegradable polymers and high shear processes. These undesirable steps render difficulties for economical scale-up.

The technology provider has developed a novel method for producing a biodegradable polymer that is based on green chemistry and easily scalable. Through their simple and novel nanoencapsulation process, the technology allows the encapsulation of most actives at submicron scale to form water-based formulation without the forementioned undesirable steps. This technology

presents a low-cost, scalable co-block amphiphilic biodegradable polymer-based nanoencapsulation that is of superior performance and stability due to its polymeric chain entanglement and nano-sized effects.

The technology provider is seeking collaborations with partners, including actives manufacturers and formulated products owners, who may have interests to adopt this encapsulation technology for hydrophobic actives in applications including insect repellents, pesticides, skincare, aromatherapy products, and pharmaceutical applications.

## TECHNOLOGY FEATURES & SPECIFICATIONS

The technology exhibits the following technical features and specifications:

- Reduces active concentration, enhances product efficacy and improves safety
- Organic solvent free
- Alcohol-free
- Water-based formulation
- Involves low energy and low temperature nanoencapsulation process
- High stability and active loading due to nano-size and polymer chain entanglement effect of polymeric nanoparticles
- Ease of use and formulation

## POTENTIAL APPLICATIONS

The technology is currently used in mosquito repellent formulations. This has been validated via mosquito cage tests and is shown to render three times more protection than non-encapsulated actives.

Potential applications of this technology include:

- Encapsulation of repellent actives like PMD, DEET, picaridin, citronella oil, etc.
- Encapsulation of aromatherapy products and essential oils – lavender, tea tree, citronella, peppermint, thyme, rosemary, oregano, lemongrass, etc.
- Encapsulation of tocopherol, tocotrienol, isotretinoin, retinoid, etc.
- Skincare cosmetics and sunscreens
- Encapsulation as means for drug delivery

## UNIQUE VALUE PROPOSITION

By using this nanoencapsulation technology, actives can be encapsulated and solubilized in water without using high energy, alcohol or surfactants. As this solution is based on the self-assembly of biodegradable amphiphilic polymer into nanoparticles containing actives within entangled long polymeric chains, the formulation stability is much superior to existing offerings.

These benefits are attractive to product owners who prefer minimal ingredients, higher efficacy, and sustainable green chemistry-based solutions.