NOVEL ENCAPSULATION METHOD

Researchers in the Department of Chemical Engineering and Biotechnology, at the University of Cambridge, have developed a novel method of encapsulating enzymes in a releasable manner. Key Features:

- Enzymes are stored in a protective environment for long periods
- Release can be triggered by dilution or shear
- Straighforward, scalable method, with levels of control for specific applications.

Potential uses:

- Encapsulation of enzymes in detergents
- Encapsulation of therapeutic biologics
- Protection of other sensitive molecules from their environment

For further information please contact:

Dr Amanda Wooding
✉ Amanda.wooding@enterprise.cam.ac.uk
☎ +44 (0)1223 760339

Cambridge Enterprise Limited, University of Cambridge
Hauser Forum, 3 Charles Babbage Road, Cambridge CB3 0GT UK
www.enterprise.cam.ac.uk

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Background

The presence of enzymes in laundry detergents can improve cleaning efficiency because of their excellent ability to break down biological material. Laundry detergents however, contain many components that are not compatible with enzymatic activity, such as surfactants, bleaches and chelators. Methods of protecting enzymes from the harsh detergent environment must therefore be employed in order to give products the desired shelf life. Enzyme encapsulation methods that are low cost, up-scalable, offer protection for months, together with release upon dilution within minutes and a particle size that isn't demanding on volume, are therefore required.

Technology

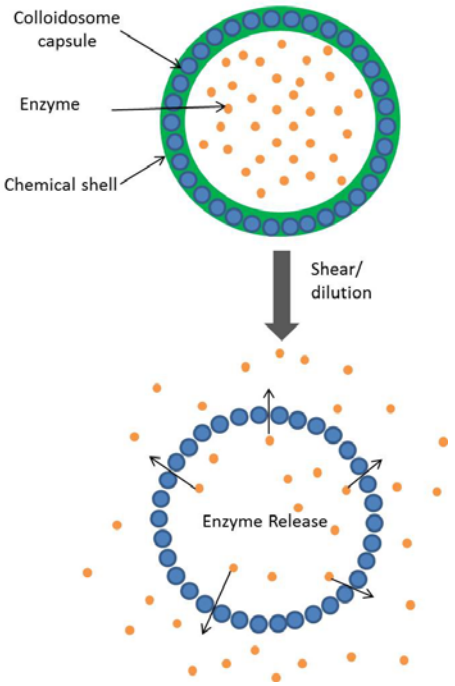
Dr Alex Routh, Professor Nigel Slater and Polly Keen, at the University of Cambridge have developed a novel method of enzyme encapsulation that uses colloidosomes and a non-harmful chemical shell (figure 1). Enzymes can be successfully encapsulated in a protective environment in a simple 3 step process and released by shear or dilution, maintaining enzymatic activity. The capsule size and level of protection can be adjusted to allow triggered release when desired. This technology has been tested for the application of using enzymes in washing detergents, with enzymes shown to be stable for at least 6 months storage (figure 2). This method is low-cost, up-scalable, and low volume, making it ideal for encapsulation of enzymes in a wide range of applications.

Commercialisation

We are seeking commercial partnership for licensing, collaboration and development of this new technology, that has recently been protected through a priority patent filing, GB 1319923.7.

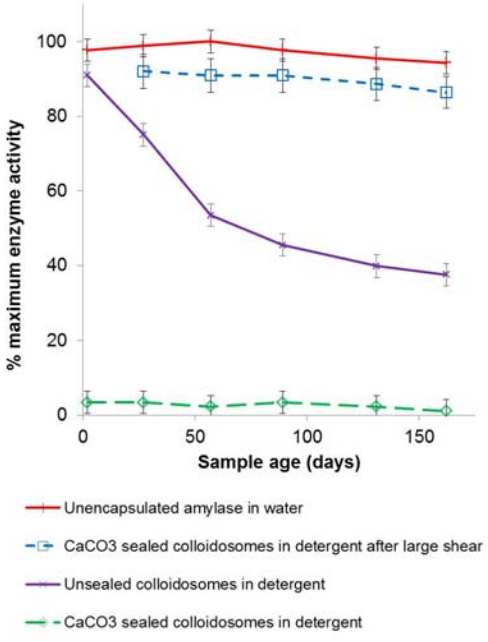
For further information please contact Amanda.wooding@enterprise.cam.ac.uk

Figure 1: Schematic of enzyme encapsulation and release



Enzyme is encapsulated within a colloidosome capsule and a chemical shell in a simple 3 step process. The chemical shell is disrupted upon physical shear or significant dilution and active enzyme is efficiently released.

Figure 2: Encapsulated enzyme is stable in detergent and active upon release by shear



Unencapsulated amylase (purple) loses activity over 6 month's storage in detergent compared to fresh amylase (red), whilst enzyme activity from **encapsulated** amylase (blue) stays stable at 90% over 6 month's storage in detergent and no undesired release of enzyme occurs without shear during this period (green).

Reference: Keen et al (2014) Encapsulation of amylase in colloidosomes, Langmuir; 30 (8):1939-48