Technology Offer

Microfluidics-based preparation of cross-linked enzyme aggregates

Field of use
Pharmaceutical, food, chemical, or biotech industries

Current state of technology
Stage 4 of technology readiness level

Intellectual property

Developed by
University of Ljubljana, Faculty of Chemistry and Chemical Technology

Reference
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Background

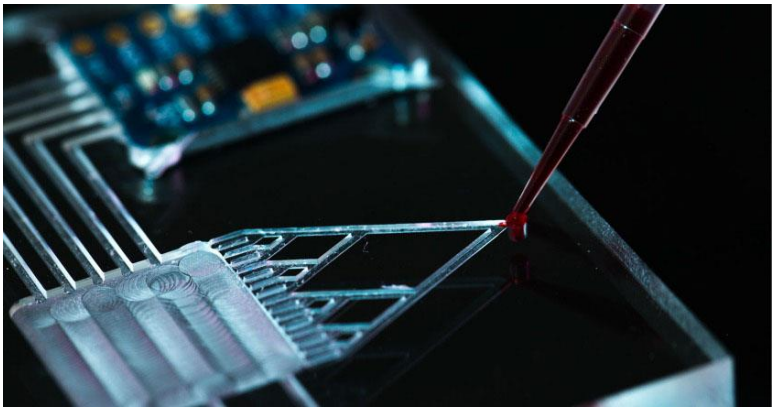
Enzymes are widely used in various industrial processes, but traditional methods of immobilization using particle carriers have limitations such as low activity retention and mass transfer limitations. Microfluidics-based methods for enzyme immobilization offer a promising alternative, generating stable and uniform enzyme aggregates without particle carriers. Microreactors based on this technology provide high retained activity and stability of the immobilized enzymes. Ongoing research aims to further improve the technology for use in various industrial applications.

Description of invention

The invention is a microfluidics-based method for generating stable and uniform cross-linked enzyme aggregates without the use of conventional particle carriers. The stabilized aggregates can be implemented in a microreactor, enabling continuous processes with high enzyme stability and retained activity. The method significantly reduces material consumption, provides good process control, and has been tested on two enzymes achieving up to 87% retained activity. The authors intend to optimize the immobilization technique and microreactor design using mathematical modeling for the specific enzyme and reaction conditions needed by the end user.

Main advantages

- Highly stable and uniform cross-linked enzyme aggregates without the use of conventional particle carriers.
- Implementation of the aggregates in a microreactor enables continuous processes with high stability and retained activity.
- The method significantly reduces material consumption, providing good process control, and facilitating rapid and cost-effective optimization of conditions for immobilizing various enzymes.
- Microreactors based on this technology offer enhanced mass transfer rates and increased surface area-to-volume ratios, resulting in high retained activity and stability of the immobilized enzymes.
- The technology has already achieved up to 87% retained activity for two enzymes tested and has reached stage 4 of technology readiness level, indicating its potential for practical applications.



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