



Stimuli-driven Droplets

Enzymatic active droplets as therapeutics for aging skin cells

教授からのコメント /

COMMENT FROM PROFESSOR

«The basic scientific question behind this project is:

Is it possible to exploit enzyme reactions to move droplets towards a stimulus (e.g., biomarkers released by aging cells)? »



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研究概要 / SUMMARY

Enzymes are the driving force of living organism because they catalyze reactions, and ultimately sustain metabolism. In a nutshell they are the motor of life. Inspired by nature in our laboratory, we developed an in vitro system that mimic the macromolecular crowding of the cytosolic medium and reach the same metabolic density of the angriest organism on earth. This system is compartmentalized in membraneless micro-droplets. Because of the membraneless feature of the droplets, substrate and product of the compartmentalized enzyme can diffuse freely allowing the enzyme and therefore droplets to be active for hours.

So far most of our droplets were pinned down on a glass surface limiting their motion. Herein we would like 1. to generate a system that will allow the enzymatic active droplets to freely move in the solution; 2. to manipulate the droplets' directionality by a substrate gradient. 3. to develop an artificial stimuli-driven device based on this droplet system.

Ultimately our droplets will have applications as delivery system for therapeutics for aging skin cells (e.g., they can be added in cosmetic cream). They will target cells delivering specific biomarkers and release slowly therapeutics for a long-sustained period of time (up to hours or a day).

寄附金の特典 / BENEFITS

1. Acknowledgement in publications and national/international talks.
2. Visit to our lab and OIST.
3. Meet the researchers involved in the project.
4. Acknowledgement in outreach initiative such as imagine exhibitions, Science Festival at OIST.