

環境中の微生物採取を志向した人工シデロフォアによる選択的な微生物捕集と培養

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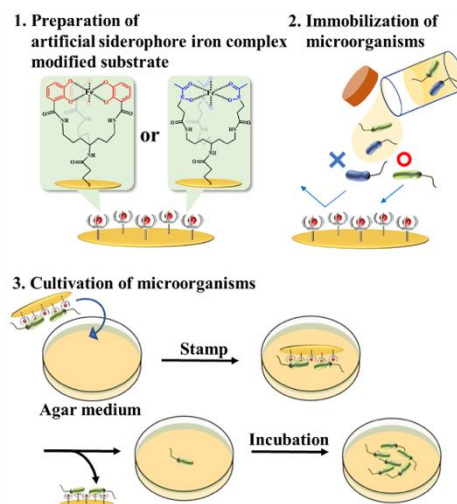
Selective microbial capture and cultivation using artificial siderophores for environmental microbial sampling (¹Graduate School of Engineering, Nagoya Institute of Technology)

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Numerous beneficial microorganisms exist on Earth. Collecting and isolating them from the environment is crucial for effectively utilizing microbes in medical and industrial applications. We have developed a technology for microbial immobilization by synthesizing artificial siderophore molecules that function equivalently to natural siderophores – chelating compounds produced by microorganisms during iron uptake – and modifying substrates with their iron complexes. In this study, we applied this technology to the screening and isolation of useful microorganisms. We fabricated artificial siderophore-iron complex-modified substrates with various structures. Using *Escherichia coli* and *Edwardsiella tarda* as model microorganisms, we attempted selective immobilization onto each substrate and confirmed the presence of target microbes on the substrate surfaces. Furthermore, utilizing these microbial immobilization substrates for cultivation in both agar and liquid media, we successfully demonstrated selective microbial immobilization and proliferation. This technology is expected to become a useful tool for isolating unknown microorganisms from the environment and investigating their cultivation conditions.

Keywords : Artificial siderophore, substrates modified with siderophores, microorganisms

地球上には、人類にとって有用な微生物が多く存在する。それらを環境中から捕集し、分離することは重要である。我々は、微生物が鉄を摂取する際に産出するシデロフォアと同等の機能を示す人工シデロフォア分子を合成し、その鉄錯体を基板に修飾させることで、微生物を固定化する技術を開発してきた¹⁾。本研究では、この技術を有用微生物の選別・分離に応用するために、右図に示すように種々の構造を有する人工シデロフォア修飾基板を作製した。モデル微生物として大腸菌とエドワジエラ菌を用い、それぞれの基板への選択的固定化を試みたところ、基板表面上で目的の微生物の固定化が確認された。これらの微生物固定化基板を利用して寒天培地および液体培地での培養を行ったところ、選択的な微生物の固定化と増殖が確認された。



1) T. Inomata, S. Endo, H. Ido, M. Miyamoto, H. Ichikawa, R. Sugita, T. Ozawa, H. Masuda, *Langmuir*, **2024**, *40*, 2632-2645.