

革新的な知や製品を創出する共通基盤システム・装置の実現

低侵襲ハイスループット光濃縮システムの開発

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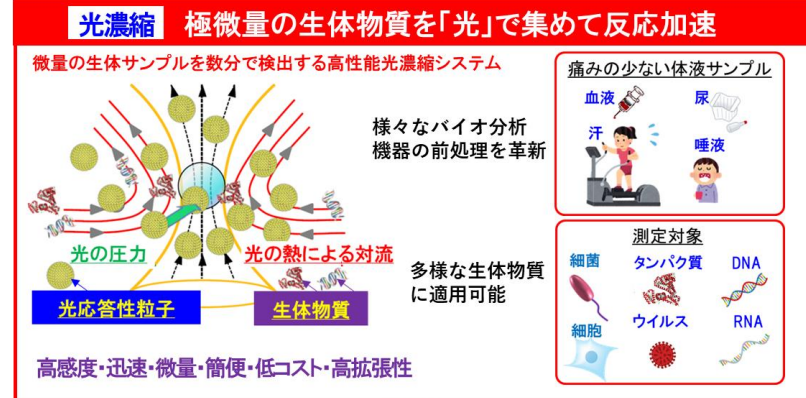
目的：

極微量の生体サンプル(タンパク質、DNA、微生物、細胞など)の機能を維持したまま、光濃縮により狙った場所で反応加速するシステムを開発し、予防医療、食品検査、環境計測を革新！

研究概要：

光が物質におよぼす力と光加熱により生じる光誘起対流の相乗効果を利用して、生体物質を濃縮して反応加速する「光濃縮」の原理を解明し、数分程度の短時間かつ従来法より桁違いの高感度で検出するシステムを開発する。
特に、液中での光濃縮下での分子間相互作用の機序解明とハイスループット計測技術確立し、医療分野への実装により超早期診断法の構築に貢献する。さらに、汎用型光濃縮システム開発により微生物検出や環境負荷物質の検出にも展開し、食品検査や環境計測の新機軸構築も目指す。

<http://www.p.s.osakafu-u.ac.jp/~t-iida/LAC-SYS/>



本技術の実装で革新が期待される社会的課題の例(医療、製薬、食品、環境)



Realization of Common Platform Technology, Facilities, and Equipment that creates Innovative Knowledge and Products

Development of Minimally Invasive High-throughput Optical Condensation System

Project Leader : Takuya IIDA

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R&D Team : Aichi Cancer Center, Osaka University, Waseda University, Okayama University



Summary :

We will develop a system accelerating biochemical reactions by “optical condensation” of a very small amount of biological samples (protein, DNA, microbe, cell, etc.) with maintaining their functions at the aimed position, and innovate the fields of preventive medicine, food inspection, and environmental measurement.

Utilizing the synergistic effect of light-induced force and light-induced convection, we clarify a principle for “optical condensation” of biological materials for the acceleration of their reactions, and develop extremely rapid and highly sensitive detection method. Particularly, we will clarify mechanisms of intermolecular interaction under optical condensation, and establish a high-throughput measurement technology for an ultra-early diagnostic method in the medical field. Furthermore, by developing a multipurpose optical condensation system, we will expand applications to the detection of microorganisms and environmentally hazardous substances, and provide innovations in food inspection and environmental measurement.

http://www.p.s.osakafu-u.ac.jp/~t-iida/LAC-SYS/e_index.html

Optical condensation Accelerate reactions in a trace amount of biomaterials

High-performance optical condensation system to detect a small amounts of biomaterials in a few minutes

Innovate pretreatment of various bioanalytical instruments

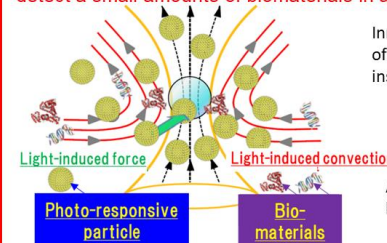
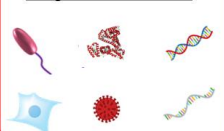


Photo-responsive particle Bio-materials
High sensitivity, Rapid, Trace amount, Convenience, Low cost, High scalability

Body fluid sample Minimally invasive



Target biomaterials

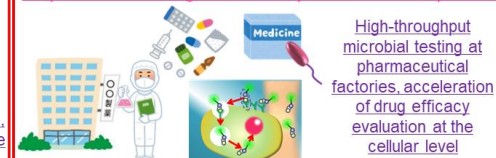


Examples of social problems and implementation of this technology (medical, pharmaceutical, food, environment)

Easy and quick inspection / diagnosis anywhere



Inspection and drug evaluation pharmaceutical process



Pre-shipment and on-site inspection of food & drink



Environmental measurement and monitoring

