東京大学 THE UNIVERSITY OF TOKYO

GMSI Graduate Program for Mechanical Systems Innovation

CIAiS Research and Education Consortium for Innovation of Advanced Integrated Science

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第319回GMSI公開セミナー／第142回CIAiSセミナー／第64回WINGSセミナー

Microfluidic Analytical Systems for Point-of-Care Diagnosis

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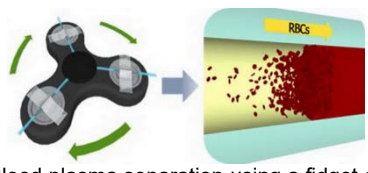
Date: Friday, 23 August, 2019, 10:30-11:30

Venue: Room 222, 2F, Faculty of Engineering Bldg. 2

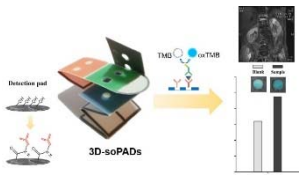
Abstract:

Healthcare issues are keeping increased substantially in recent years. Such research and investment have focused on fighting major diseases, enabled by the novel invention of efficient drug development for treatment and side effect reduction, along with the improved vector control. However, classic diagnostic technologies are not completely suited to meet the expanded testing requirement because they rely on complicated sample purification and sophisticated instruments which are complicated, time-consuming, expensive and requirement of well-trained technicians.

In order to the improved efficiency in laboratory diagnostics, there has been a trend towards more decentralized diagnostics which occurs directly at patients' bedside, in outpatient clinics or at sites of accidents, so-called point-of-care (POC) systems. The concept of POC testing is mainly by the patient, so short turnaround time, minimum sample preparation, long-term reagent storage, user-friendly analytical instruments and visible quantitative or semi-quantitative single readout is crucial. In our research group, we address the need using silicon, polymer and paper-based analytical platforms. They have been developed for biomedical sensing and analysis in resource-limited settings based on their advantages of low sample volume requirement, rapid detection, cost effectiveness, portability and high-integration. Moreover, different sensing components, including device fabrication, surface chemistry, signal amplification and biomolecular recognition are also investigated. We have successfully shown that our proposed fidget-spinner based system, three-dimensional surface-modified origami-paper-based analytical device (3D-soPAD) platform, a synthetic tube-in-a-tube (Tube∧2) semiconductor sensor, and the hybrid microfluidic system can provide sensitive, high-throughput, and on-site environmental and disease monitoring in resource-limited settings.



Blood plasma separation using a fidget-spinner



Paper-based device for immunoassay applications

主催: 東京大学大学院工学系研究科専攻間横断型教育プログラム 機械システム・イノベーション（GMSI）
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