Title of Research:

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Development and practical verification of a comprehensive system to monitor multiple instances of environmental pollution in the Mekong River basin

Principal Investigator:

Kazumasa Hirata, PhD (Professor, Osaka University, Pharmaceutical Sciences; 1-6 Yamadaoka, Suita, Osaka 565-0871, Japan)
(tel) +81-06-6879-8236, (e-mail) hirata@phs.osaka-u.ac.jp

Collaborators:

Kazuo Harada, PhD (Osaka University, Pharmaceutical Sciences); Hideyuki Matsuura, PhD (Osaka University, Pharmaceutical Sciences); Yoshinori Sumimura (Osaka University, Center for Global Initiatives); Nguyen Quang Trung (Institute of Environmental Technology, Department of Environmental Toxic Analysis); Misa Muraoka (Osaka University, Pharmaceutical Sciences); Tran Thi My Duyen (Can Tho University, College of Aquaculture and Fisheries); Jun-ichi Nishikawa, PhD (Mukogawa Women's University, School of Pharmacy and Pharmaceutical Sciences); Taku Yamashita (Mukogawa Women's University, School of Pharmacy and Pharmaceutical Sciences)

Summary of Research:

Multiple instances of serious environmental pollution in Southeast Asia have been caused by contamination from agricultural chemicals, endocrine disruptors, heavy metals, and antibiotics. It is therefore important to monitor food and environmental samples from polluted areas to ensure public safety. However, it is difficult to introduce monitoring systems based on expensive, high-quality analytical instruments in areas that often lack other resources. The aim of our project is to develop a novel comprehensive system to monitor contamination in such localities. In this study, we focused mainly on constructing low-cost, easy-to-use, and easy-to-transport paper-based bioassays for antibiotics and endocrine disruptors, in which the biomolecular reactions constructed to detect target chemicals were embedded on paper through the process of freeze-drying. The response signal of this bioassay can be detected by a digital camera and thus does not require expensive conventional laboratory instruments, making it especially suitable in low-resource localities.

Timeline:

November, 2013 -

Topics:

JCIA-LRI 5th Research Report Meeting (Tokyo, August, 2017; Poster presentation)

Publications:

1. 氏家和紀、松浦秀幸、Tran Thi My Duyen、原田和生、平田收正: 「無細胞反応系を用いた抗菌剤検出のための紙基板バイオセンサーの開発」、第 69 回日本生物工学会大会、東京、2017 年 9 月
2. 松浦秀幸、氏家和紀、Tran Thi My Duyen、原田和生、平田收正: 「Development of paper-based biosensors using cell-free system for detection of antibiotics」、2017 年度生命科学系学会合同年次大会、神戸、2017 年 12 月
3. 氏家和紀、松浦秀幸、Tran Thi My Duyen、原田和生、平田收正: 「組換え葉酸合成酵素を用いた紙基板サルファ剤センサーの開発」、日本農芸化学会 関西・中四国・西日本支部 2017 年度合同大阪大会、大阪、2017 年 9 月
4. Kazuki Ujiie, Hideyuki Matsuura, Tran Thi My Duyen, Koki Izutsuu, Kazuo Harada, Hideyuki Matsuura, Kazumasa Hirata: "Paper-based luminescence bioassay method embedding a sequence of enzymatic reactions to detect sulfonamide groups" *submitted*
5. Kazuki Ujiie, Hideyuki Matsuura, Tran Thi My Duyen, Koki Izutsuu, Kazuhito Fujiyama, Shinichiro Maeda, Kazuo Harada, Hideyuki Matsuura, Kazumasa Hirata: "Development of a paper-based luminescence bioassay for therapeutic monitoring of aminoglycosides" *in preparation*