

Title of Research:

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Development and practical verification of a novel comprehensive monitoring system for multiple contaminations of environmental pollutants in the Mekong River basin

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Summary of Research:

Serious environmental pollution of the international river basins of Southeast Asia, such as the Mekong River basin, has been caused by multiple contaminations of pollutants such as agricultural chemicals, endocrine disruptors, heavy metals, and antibiotics. It is, therefore, important to monitor food and environmental samples from these areas to ensure public safety. The aim of our project is to develop a novel comprehensive monitoring system for multiple contaminations, for use in ASEAN countries. In the present study, we mainly focused on constructing biosensors for sulfonamides that inhibit bacterial folate synthesis and other antibiotics that inhibit bacterial protein synthesis. Each antibiotic was detected using a series of enzymatic reactions performed on pattern-printed papers, such as those including a folate synthetic enzyme or in vitro protein synthesis, in a low-cost, easy-to-use, and easy-to-transport manner. The response signal of the paper-based biosensor can be detected by the naked eye or a digital camera, and, therefore, does not require high-cost conventional laboratory instruments, making it especially suitable in low-resource localities.

Timeline:

November, 2013 -

Topics:

2016 ICCA-LRI and NIHS workshop "Development of novel biosensors for detecting environmental pollutants"

Publications:

1. Tran Thi My Duyen, Hideyuki Matsuura, Kazuki Ujiie, Misa Muraoka, Kazuo Harada, Kazumasa Hirata: "Paper-based colorimetric biosensor for antibiotics inhibiting bacterial protein synthesis", *Journal of Bioscience and Bioengineering*, 123(1): 96-100, 2017
2. 氏家和紀、Tran Thi My Duyen、松浦秀幸、村岡未彩、原田和生、平田収正: 「タンパク質合成阻害作用を持つ抗菌性物質検出のための紙を基盤とする比色センサーの開発」、第 65 回日本分析化学会年会、札幌、2016 年 9 月
3. Tran Thi My Duyen, Hideyuki Matsuura, Kazuki Ujiie, Misa Muraoka, Kazuo Harada, Kazumasa Hirata: "Paper-based colorimetric biosensor for antibiotics targeting bacterial protein synthesis", 第 68 回日本生物工学会大会、富山、2016 年 9 月
4. Tran Thi My Duyen, Kazuki Ujiie, Misa Muraoka, Kazuo Harada, Hideyuki Matsuura, Kazumasa Hirata: "Development of paper-based biosensor for detection of antibiotics targeting protein synthesis", Biosensors 2016, Gothenburg, Sweden, May 2016