

# Deep Sea Deployment of A Microfabricated In Situ Gene Analysis System and Its Functional Sophistication

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## 【Outline of survey】

Surveying total biomass and biological diversity in the Ocean that covers 70% of the Earth surface is one of the most important tasks for better understanding of material's global circulation. This project is to develop a system which is capable of analyzing genes in deep sea environments in situ, introducing microfluidic devices that is fabricated through semiconductor fabrication processes. The advanced functions of the system is developed through at-sea experiments participating in some scientific cruises, for example, in Okinawa Trough. And also the integration of the systems onto Environmental Sample Processor, developed by Monterey Bay Aquarium Research Institute in the US, is planned. The developed system will enable us to monitor spatio-temporal dynamics of deep sea ecological system at gene level without any problems, usually lie in the conventional measurement methods, such as contamination of samples, changes in environmental conditions, etc.

## 【Expected results】

Although the observation platforms such as Autonomous Underwater Vehicles (AUVs), Deep Sea Drilling Ships, Cable-based Observation networks, etc. have been remarkably developed, the measurement systems to be mounted or installed onto these platforms have hardly been developed so far. The technologies developed in this project will contribute to the break-through in the field of hydrosphere monitoring not only in the ocean but also in coastal waters, rivers, lakes, etc. They could also lead to the advancement in researches into global warming, origin of life, exploration of useful materials, etc. in the long run.

## 【References by the principal researcher】

Fukuba, T., Naganuma, T., and Fujii T.: "Microfabricated Flow-through Device for DNA Amplification -Towards in situ Gene Analysis -", Chemical Engineering Journal, Vol.101, No.1-3 (2004) pp.151-156

Fujii, T.: " PDMS-based Microfluidic Devices for Biomedical Applications", Microelectronic Engineering, Elsevier, vol. 61-62C (2002.7) pp 907-914

【Term of project】 FY 2005 - 2009

【Budget allocation】 70,200,000 yen

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