

# Development of ELISAs for quantification of surfactants, endocrine disruptors and estrogens, and their application for environmental and biological sample analysis

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## Biographical Sketches of Authors

Masato Hirobe is a biochemical scientist and has served as a researcher of department of research and development, Japan EnviroChemicals. Since 2000, he has been developing the ELISA kits for monitoring environmental pollutants such as surfactants, endocrine disruptors and estrogens by generating monoclonal antibodies.

Fernando Rubio is biochemical scientist and a president of Abraxis, LCC. Fernando has developed immunoassays for analytes of clinical and environmental significance since 1976. His current interests are the development of immunochemical products to serve the agricultural, environmental, food safety and clinical markets.

Masanori Fujita is a professor of department of environmental engineering, Osaka University. His laboratory covers various kinds of research areas such as 1) waste and waste water treatment, 2) bioremediation, 3) environmental monitoring and assessment and 4) recycling and reclaiming of waste and waste water by combining biological and engineering technology.

Hiroaki Shiraishi is a head of analytical quality assurance section, environmental chemistry division, National Institute for Environmental Studies (NIES) since 1997. Since 2001, he has also served as a head of exposure assessment section of research center for environmental risk, and as a team leader of chemical, bioassay & dynamics research team of endocrine disruptors & dioxin research project of NIES.

## Abstract

Ten kinds of enzyme-linked immunosorbent assay (ELISA) systems were developed for the quantitative analysis of surfactants [linear alkylbenzene sulfonates (LAS), alkyl ethoxylates (AE), and alkylphenol ethoxylates (APE)], endocrine disruptors [alkylphenol (AP), AP+APE, and bisphenol A (BPA)] and estrogens [17beta-estradiol (E2), estrone (E1), estrogen (ES: E1+E2+estriol (E3)), 17alpha-ethynylestradiol (EE2)]. The lowest quantification limits of these ELISAs were 20 µg/L (LAS, AE and APE), 5µg/L (AP, AP+APE), 0.05 µg/L (BPA) and 0.05 µg/L (E2, E1, ES and EE2), when the following standards were used: LAS (alkyl chain length of 12), nonylphenol ethoxylate (average-ethoxy chain length of 10), AE (alkyl and ethoxy chain lengths were 12 and 7), nonylphenol (NP), NP, BPA, E2, E1, E2 and EE2, respectively. The specificity of each ELISA was confirmed by testing several compounds, which have structural resemblance to the compounds of interest. These ELISAs were also validated by comparing them with instrumental analytical methods such as high-performance liquid chromatography (HPLC), liquid chromatography-mass spectrometry (LC-MS) and liquid chromatography-tandem mass spectrometry (LC-MS/MS) with environmental and biological samples. Good correlations were observed between the ELISAs and instrumental analytical methods in all cases.