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Assessment of polluted factors in aquatic environment using near infrared spectroscopy

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Eutrophicaton processes of aquatic environment are strictly correlated with the concentration levels of nitrogen, phosphorous, organic matter and biological parameters such as phytoplankton and chlorophylla (Tremel, 1996; Burns *et al.*, 1997; Young *et al.* 1999; Wei *et al.*, 2000). Accordingly, the monitoring and evaluation of these factors will provide useful information about the health of aquatic ecosystem. However, the traditional types of auqatic chemistry analysis and ecological monitoring of phytoplankton are time-consuming, costly, and further resulting in secondary pollution due to the use of reagents.

NIR (near-infrared) spectroscopy, as a rapid, non-destructive, little sample preparation and reagents-free technology (Hildrum *et al.*, 1992), has been extensively applied to the characterization of food (Osborne and Fearn, 1988), pharmaceutical (Morisseau and Rhodes, 1995) and textile materials (Cleve *et al.*, 2000). Currently, NIR technology has been used indirectly in inferring lake water chemistry by two approaches, suspended (Malley *et al.*, 1996) or seston (Dabakk *et al.*, 1999), and sediments (Korsman *et al.*, 1992; Malley *et al.*, 1999).

In addition, the evaluation of trophic state and the identification of the key factors contributed to the trophication are the key step to restore the damaged aquatic environment. Moreover, an understanding of the factors, which regulate the algal proliferation, is crucial to the successful management of aquatic ecosystem.

In the paper, NIR technology will be used to study the environmental factors affecting the algal proliferation in combination with the trophic state index and diversity index. This novel developed system can be applied in monitoring and evaluating allopathic water environment and provide real time information services for the aquatic environment management.