Distribution and carbon isotope composition of lipid biomarkers in lake sediments on the Tibetan Plateau

JINCAI TUO[1], MINGFENG ZHANG[1], RU CHEN[1,2], YILIANG LI[3] AND CHUANLUN ZHANG[4]

[1]Key Laboratory of Petroleum Resources Research, Institute of Geology and Geophysics, Chinese Academy of Sciences (jctuo@ns.lzb.ac.cn)

[2]Graduate University of the Chinese Academy of Sciences, Beijing, 100039, China

[3]Department of Earth Sciences, University of Hong Kong, Hong Kong, S.A.R. China

[4]Department of Marine Sciences, University of Georgia, USA

Distribution and carbon isotope composition of lipid biomarkers such as n-alkanes, n-fatty acids, and n-alkan-2-ones from recent sediments in Erhai and Gahai brackish-water lakes (the satellite lakes of Qinghai Lake) and soil sample in an alpine meadow, located in the catchment of Qinghai Lake, were analysed by GC-MS and GC-IRMS. Abundance n-fatty acids and lower amount of n-alkanes and n-alkan-2-ones have been detected in different distribution patters from algal mats, sandy mud and alpine meadow soil samples. From the distribution patterns and the carbon isotopic compositions of the lipid compounds detected from the recent sediments, it can be concluded that a mixture input of epicuticular waxes of higher plants and submerged or floating aquatic macrophytes can be the source of long-chain n-alkanes, n-fatty acids are mainly attributed to the submerged or floating aquatic macrophytes and bacteria organic matters whereas the epicuticular waxes of higher plant or grass from catchment which have been reworked by the bacterial may be the possible source for the n-alkan-2-ones observed. The two samples from Lake Erhai had heavier ^{13}C values of both bulk organic carbon and specific carbon compounds than samples from Lake Gahai and the meadow soil and can be best interpreted by enhanced productivity due to lower salinity and limited CO_2 that caused the enrichment in ^{13}C of the dissolved inorganic carbon of the lake water. Thus the contents and the distribution patterns of the lipid compounds and theirs carbon isotopic compositions can be used as biomarkers for assessing the sources of the organic matter in lake and soil sediments.

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Detection of nanoparticles in the environment using field flow fractionation coupled to single particle ICP-MS

JANI TUORINIEMI AND MARTIN HASSELLÖV

Department of Chemistry Göteborg University, Kemigården 4 405 30 Göteborg Sweden (martin.hassellov@chem.gu.se, jani.tuoriniemi@chem.gu.se)

The main challenges of detection and characterization of engineered nanoparticles in aquatic environmental samples are that there are extremely few engineered nanoparticles but plentiful of natural or unintentionally produced nanoparticles. The high background levels of nanoparticles renders otherwise powerful microscopic techniques (e.g. TEM, AFM) useless. This is because the need to screen millions or billions of background nanoparticles in order to have measured and characterized enough ENP.

Our aim is to develop an analytical method with low enough detection limits and high enough selectivity to enable single nanoparticle detection and analysis in size fractionated aqueous samples.

Initial experiments with Field-Flow Fractionation (FFF) coupled to ICPMS in an ultra fast scanning mode show promising preliminary results. It is possible to detect individual nanoparticles if the scan time is reduced to a level comparable to the duration of the bursts of ions generated by particles atomized in the plasma. We have shown that there exists a linear relationship between the particle concentration and the number of particles counted. Our current research aims at improving the quantification abilities of the method. Results will be shown for engineered nanoparticles in a highway runoff water, and wastewater treatment plant sample.