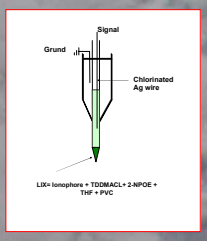
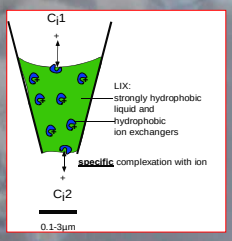
Application of a Liquid-ion-exchange Microsensor for in-situ Measurement of Sulfate in Freshwater and Marine Sediments

Al Raei A.M., Böttcher M.E., deBeer D., and Ferdelman T.G.

Max-Planck Institute for Marine Microbiology, Bremen, Germany
aalraei@mpi-bremen.de

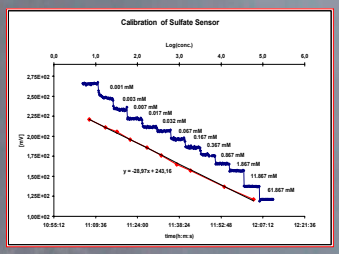
Especially in sediments with high near-surface activities of sulfate-reducing bacteria and in sulfate-limited fresh-water sediments steep sulfate gradients may develop. Therefore, precise high-resolution sulfate measurements are fundamental for the evaluation of consumption and production of sulfate in dynamic surface sediments such as intertidal flats.

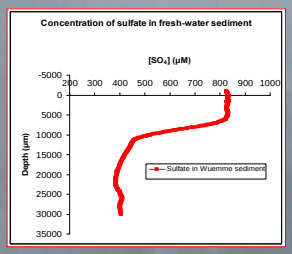


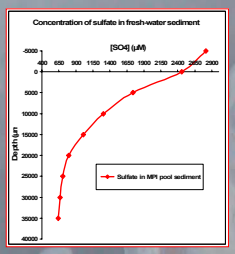


We have adapted a potentiometric sulfate microsensor for *in-situ* measurements that has a membrane containing an ionophore with a high selectivity for sulfate

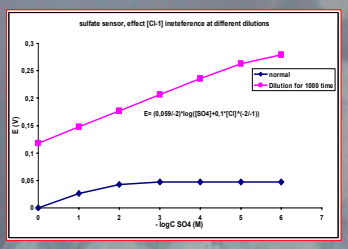
Our sulfate micro electrodes exhibit a Nernstian response to sulfate in the concentration range from 10^{-6} to 10^{-2} M and work well in fresh waters.

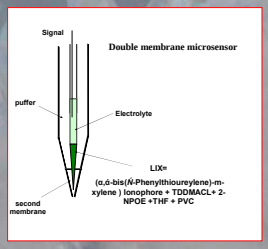


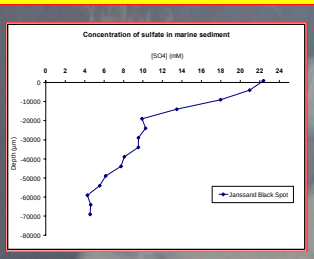


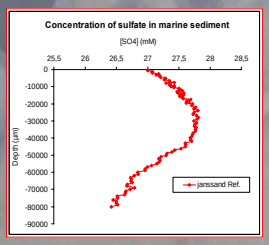


The Cl^- and SO_4^{2-} responses have different slopes. Therefore, sensor-internal sample dilution is required to bring the [Cl^-] in a range with no Cl^- interference. We have modified the electrode to minimize the influence of chloride for use in marine sediments. Results are presented from the North German coastal area.









Acknowledgements:

The authors gratefully acknowledge financial support from Deutsche Forschungsgemeinschaft during DFG-SPP ‚BioGeoChemistry of the Wadden Sea' (JO 307/4-3) and Max Planck Society.