Metal waste prevention

Results in Brief

Improvements in analytical methods of analysis

With regulations on the quality of wastewater tightening, it is becoming increasingly necessary to develop new technologies to assess water quality.

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Isotachophoresis, ITP, is a technique, which is particularly efficient in analyses of trace components, often in complex matrices, such as wastewaters. This is primarily attributed to the fact that on-line sample concentration may be performed. In addition, where specialised equipment designed for ITP analyses is utilised, concentration, removal and subsequent quantification of individual component zones in a complex mixture can be carried out in one run. This specialised equipment also allows for increased sample loadings.

ITP is performed using a discontinuous buffer system comprised of a lead electrolyte (LE) and a terminating electrolyte (TE). The LE is selected so as to contain ions of higher mobility than the analyte ions of interest, and the TE ions with lower mobility. Sample is introduced as a plug sandwiched between the LE and TE, and upon application of a potential across the capillary, the analyte components separate into discrete bands.

The development of an ITP sensor platform was undertaken using silicon micromachining, electroplating, injection mould processing, metallisation and gluing. The sensor consists of a polycarbonate channel plate and cover lid which is metallised. The two components are bonded together. Using an isotropic plasma etching process, three different channel geometries were etched into silicon and the silicon surface was transferred to a nickel injection-moulding tool. The channel precision was then transferred to the plastic channel plate. The detection electrodes were developed using a sputtering process for good adhesion starting layers followed by electroplating to increase their thickness. The sensor set-up system is being established with a high power supply and control interface, and evaluation software.

The sensor is currently at the development stage. Potential areas of use are in water analysis and also in other industries where quality analysis is required such as the chemical, pharmaceutical and food industries.

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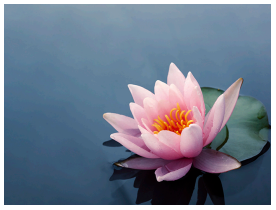

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Project Information

MEWAPREV

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Coordinated by
KATHOLIEKE HOGESCHOOL SINT-LIEVEN
Belgium

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