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HPLC Detection Based on Tuning Fork Resonator Technology

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Abstract

Mechanical resonators in shape of a tuning fork can sense any substance dissolved in eluent that differs from a pure eluent in dielectric constant, conductivity, viscosity and density via a resulting shift in resonance frequency and amplitude of a generated signal. For purpose of detection of molecules in a flow stream, we have confined a miniature tuning fork in a flow cell of internal volume approximately 15 microliters and configured its connection through a lock-in amplifier with an analog output to serve as a typical HPLC detector. The resulting response trace shows wide dynamic range with sensitivities comparable to a typical commercial concentration detector. The tuning fork detector (TFD) was tuned and applied as a viscometric detector to monitor a GPC separation of polystyrenes. In another configuration, the TFD can work as a universal concentration detector. After deconvolution of the TFD signal across a short frequency sweep, complete information on the sample viscosity, density and dielectricity can be obtained without a need for additional concentration detection. Applicability of the TFD as a viscometric detector is to be demonstrated by comparison of the TFD-calculated and known molecular weights in a range of several orders of magnitude. Potential use of the TFD as a universal concentration detector will be addressed as well.

Options

Requested presentation: Poster

Requested session: Advances in Technology - Instrumentation/Detectors

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