Interfacing microfluidic handling with spectroscopic detection for real-life applications via the lab-on-valve platform: A review

One of the current needs within the analytical spectrometric community is the development of straightforward and cost-effective, yet rugged, sample processing procedures aimed at precluding both spectroscopic and non-spectroscopic matrix interferences while fostering concomitant sample enrichment. Illustrated via selected representative examples, this review presents and discusses the current state of the art in implementing miniaturised and automated sample treatments for environmental and biochemical assays via microfluidic systems exploiting the lab-on-a-valve (LOV) platform in hyphenation with syringe pump propelling devices as a front end to a plethora of spectroscopic detection schemes including UV-Vis spectroscopy, spectrofluorimetry, chemiluminescence, AAS, AFS and ICP-AES/MS. In contrast to lab-on-a-chip units, the versatile configuration of the micromachined LOV readily facilitates the implementation of on-line unit operations at will encompassing not merely the introduction of minute, well-defined volumes of sample followed by chemical derivatization, but the potential for accommodation of solid-phase extraction, hydride/vapour generation, precipitation/coprecipitation and bead injection protocols with no need for chip redesign.