30th Annual Congress on Nanotechnology and Nanomaterials

8th World Congress on Spectroscopy and Analytical Techniques

September 10 - 11, 2018 | Stockholm, Sweden

Handheld Raman, mid-infrared and near-infrared spectrometers: state-of-the-art instrumentation and realistic application potential

Heinz W Siesler University of Duisburg-Essen, Germany

Ithough the last four decades are characterized by a multiplicity of hard- and software developments for vibrational spectroscopy Λ such as hyperspectral imaging, introduction of light-fiber optics, special sampling probes and multivariate, chemometric evaluation routines, the techniques always remained a domain for scientists only. In contrast, the recent developments of miniaturized, handheld spectrometers - often advertised as scanners - at least partially show promise for useful every-day-life applications by non-expert user environments. Inside the molecular spectrometer market, the fastest growing segment is miniature spectrometers and Tematys (Paris) expects the market of these instruments to reach \$ 300m by 2021. This significant growth will not only be based on a wider adoption of spectrometers for industrial process control, in-the-field and on-site measurements but also on every-day-life consumer applications like food testing. The reduction of instrument size, however, must not lead to compromise in measurement performance and precision and handheld instrumentation will only have a real impact if Raman, MIR and NIR spectra of comparable quality to laboratory spectrometers can be obtained. The presentation will provide an overview on the building principles and performance parameters of state-of-the-art handheld vibrational spectrometers and discussion about the pros and cons of the different techniques and highlight the advantages of on-site measurements by means of selected applications. Examples such as on-site determination of nutritional parameters of meals and authentication of seafood, discrimination of fake from genuine silk carpets, ivory and gem stones, and quantitative determination of pharmaceutical formulations or hydrocarbon contaminations in soil as well as identification of polymer waste will demonstrate the extremely broad range of available every-day-life applications with future potential. Finally, the transfer of spectra that have been measured on a laboratory spectrometer to the format of a handheld instrument will be shortly discussed. Thus, despite the extreme differences in spectral range and resolution, data sets that have been collected and calibrations that have been developed thereof, respectively, over a long period on a laboratory instrument can be conveniently transferred to a handheld system without the requirement for elaborate complete rescanning and recalibration of spectra.

hw.siesler@uni-due.de

Notes: