HDIP: powerful LA-ICP-MS data reduction software with extensive data interogation tools

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In recent years, the volume of data in mass spectrometry imaging (MSI) methods has been steadily increasing, as well as the time required by the user to process MSI data, as a result of advances in lateral resolution, increases in the dimensionality and the emergence of multiplexed, complex data sets. Efforts within the community have given rise to numerous data reduction software packages, notably the Iolite project, GLITTER and LADR to resolve the data reduction problem. HDIP is an advanced software platform for processing transient mass spectrometry signals, with a specific emphasis on laser ablation-inductively coupled plasma-mass spectrometry imaging, focused on going beyond the limitations of the current software packages, and with a strong focus on imaging applications. HDIP is based around the HDF5 file-type for full metadata retention and its ability to deal with large files. In contrast to many closed file-formats from the current software packages, this file-type is readily accessible by many other pieces of software, permitting a higher level of flexibility and transparency. HDIP is currently operational at more than a dozen laboratories, and aims to become an important player in LA-ICP-MS data processing software in the next years, through continued development and deployment cycles of the software to incorporate increasingly advanced features. Raw detector data can be imported from a broad range of ICP-MS instrument manufacturers and other microscopy techniques, whilst the laser log data captured in Chromium can be directly imported. HDIP uses an advanced algorithm that can reconstruct an image from any lasing approach, i.e. the reconstruction does not require an image to consist of line scans. Background correction and drift correction can be performed using a multi-spline higher-order degree fitting curve through selected sections of the signal, thus compensating for instrumental drift during a measurement. Convolution, deconvolution and denoising filters can be applied to improve the spatial resolution of the reconstructed images. Advanced multivariate analysis tools are also present; for example, collections of voxels within the image can be selected and clustered, and statistical analysis can be performed on the group of clusters. Multi-standard external calibration with internal standardization is possible, allowing for better calibration curves to be constructed. Many other features are present, which will be highlighted in this talk.