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Chemical Speciation Imaging using Fast X-ray Fluorescence Microscopy: Update on capabilities and future directions

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X-ray fluorescence microscopy (XFM) can be used for elemental and chemical microanalysis across many length scales and is a powerful tool for quantitatively mapping trace elements within whole biological specimens [1]. Advances in X-ray fluorescence detection schemes [2, 3] now enable acquisition at mega-pixel per hour rates which in turn allows collection of 3D information in realistic times. Chemical speciation imaging (CSI) results in an image stack with the third dimension containing a XANES spectra in each pixel [4]. Fitting of spectra with incident X-ray beam energy tracking has been developed in GeoPIXE software using the Dynamic Analysis method [5, 6]. CSI has been demonstrated with moderate definition (10,000s of pixels/image) across a diverse range of applications [7, 8]. Recent studies have improved the efficiency and sensitivity of CSI to environmentally relevant concentrations.

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Summary

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