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## Dual elemental and molecular imaging by MeV SIMS and micro-PIXE on biological tissue samples

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In the last decade, there has been a growing interest in the elemental and biomolecular distribution on the tissue surface. These species are localized to a specific region of the tissue and play an important role in biochemical processes. Therefore, it is important to investigate the spatial distribution, structure and function of these biological species [1]. The current surface characterization techniques provide unique but limited information on laterally-resolved elemental and molecular distributions. In order to overcome these limitations, we are using a dual imaging technique by combining micro-PIXE [2] and MeV SIMS [3,4] capable of providing us with the elemental and molecular distribution on the same tissue samples.

The MeV SIMS measurements are performed by a 5.8 MeV  $^{35}\text{Cl}^{6+}$  primary ion beam focused to a dimension of  $20\ \mu\text{m} \times 20\ \mu\text{m}$ . The acquired molecular maps are then correlated with the sequentially measured elemental maps by micro-PIXE, measured at the matched sample region. Micro-PIXE maps are acquired by a 3 MeV proton beam and the current lateral resolution limit of  $700\ \text{nm} \times 700\ \text{nm}$ . The current status of the dual imaging technique as well as the tissue sample preparation protocols will be presented at various plant case studies, with an emphasis on the leaves of Al-treated tea plants (*Camellia sinensis*). The correlated elemental and molecular distributions on other tissue types, including animal brain and human hair, will also be presented.

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