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Near-field Approaches to Subcellular Tissue Ablation DEEPA RAGHU, George Washington University, JOAN HOFFMANN, Applied Physics Laboratory, BENJAMIN GAMARI, University of Massachusetts, ANDREW GOMELLA, MARK REEVES, George Washington University — We report on the development of a near-field approach to MALDI (Matrix-assisted laser desorption and Ionization). In this technique analytes embedded in an energy- absorbing matrix are ablated from the surface of a sample. In the infrared region, the matrix can be water by exciting the 3-micron vibrational mode of the water molecule. We use a 3-micron wavelength lasers, coupled with a near-field scanning microscope to ablate material from cells of different membrane stiffness. We have been able to reproducibly ablate features as small as 1 micron in diameter in cell and have characterized the power-dependence of the ablation process. We will review our findings and describe demonstrations of tissue modification by this approach at length scales smaller than a single cell. This approach has the potential to allow the identification and mapping of proteins expressed in intact cells and tissues, which is of great interest as protein expression connects genomic information with the functioning of an organism.

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