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Laser Desorption Ionization from Laser Induced Silicon Microcolumns: Surface Morphology and Chemistry BENNETT N. WALKER, George Washington University, GUERMAN PASMANIK, Passat Inc., MD, AKOS VERTES, George Washington University — Nanomaterials and mesostructures, such as laser induced silicon microcolumn arrays (LISMA), offer new matrix-free platforms for laser desorption ionization (LDI) of biomolecules. The morphology and surface chemistry of LISMAs depend on the processing environment and the laser parameters. Column diameters and lengths as well as periodicity, observed by AFM and SEM, depend on processing conditions (processing medium, laser pulse energy, pulse length and angle of incidence, etc.). Capillary waves at the molten silicon–processing liquid interface seem to initiate the development of LISMA structures. This is reflected by the correlation between the array morphology and the processing liquid density and interfacial tension. Ion yields from the various surfaces are dramatically affected by the pH of the processing environment, indicating a strong influence of the OH-terminated sites on the silicon surface. Ion generation from LISMAs also significantly depends on the angle of the desorbing laser incidence, potentially suggesting energy coupling through an antenna array mechanism.

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