



## Transmission Geometry Infrared Laser Desorption Ionization Mass Spectrometry

### Introduction

The ablation potential of IR versus UV lasers can be many orders of magnitude greater due to lower absorption coefficients for many materials. This translates into deeper penetration depths and higher fluence requirements for IR LDI. Faster sample material depletion is a drawback of this process; however, there are some useful advantages of greater ablation. Analytes embedded in thick media such as 2D gels, tissues and cells can be analyzed. Another advantage is the possibility of backside illumination (Figure 1) where samples are deposited on transparent substrates and desorbed and ionized from the back of the sample at normal incidence as opposed to front irradiation (45° incidence). Novel ion source geometries as well as better mass spectrometry imaging resolution through better focusing are possible benefits of this technique. In this application note, IR LDI backside illumination of the peptide, angiotensin III, will be shown.

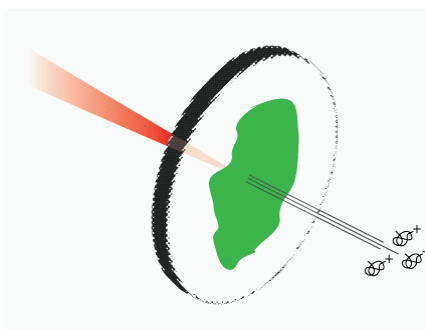


Figure 1. Schematic of backside illumination configuration

### Experimental Conditions

The peptide angiotensin III (MW = 934 Da) was dissolved in 1:1 acetonitrile/1% TFA at a final concentration of 2 mM. In order to produce a thick film, 20 µL of the peptide solution was deposited on a 117.6 lpi Ni mesh target and dried with hot air. The resulting film spanned the gaps of the grid and was irradiated with 2.94 µm mid-IR laser light at 2 Hz using an IR Opolette (Figure 2). The laser fluence was set to 1.25 J/cm<sup>2</sup>.

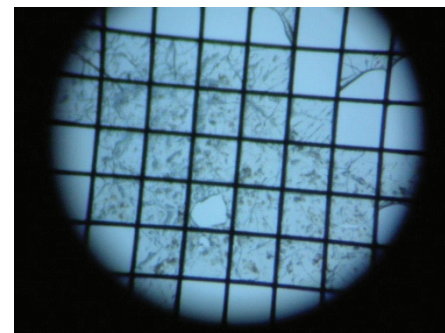


Figure 2. 4x digital image of peptide film dried on Ni grid

### Results

Backside illumination mode mass spectrum of angiotensin III can be seen in Figure 3. The laser is focused between the grid spacing; therefore only sample material is irradiated. The base peak is the protonated analyte ion. Adduction of sodium and potassium can also be detected. Sodium and potassium ions as well as some low intensity peaks from 0 to 1,000 m/z can be seen. These peaks are tentatively assigned as analyte fragment ions.

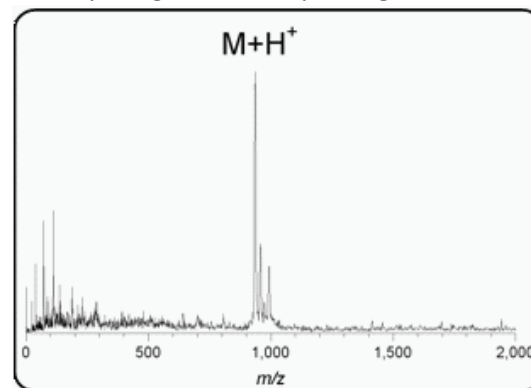


Figure 3. IR LDI of angiotensin III in transmission geometry mode ( $\lambda = 2.94 \mu\text{m}$ , 5 shot average)

### Conclusions

IR LDI of angiotensin III in backside illumination mode was successfully demonstrated using a tunable mid-IR OPO. Future work will focus on minimizing the laser spot size using a microscope objective.

### Acknowledgements

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