

Real Time Analysis of *Bacillus species* Strain specific analysis by MALDI Aerosol ToF Mass Spectrometry

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INTRODUCTION

Bioaerosol particles such as micro-organisms *e.g.*, spores, bacteria and viruses can be health-threatening, especially when dealing with terrorist threats. Techniques for rapid and accurate microbial identification are crucial for recognizing bio warfare threats and a wide range of environmental and medical applications. Matrix Assisted Laser Desorption/Ionization Time-of-Flight Mass Spectrometry (MALDI-TOFMS) has emerged as a reliable generic laboratory technique, suitable for toxins, viruses, bacteria and spores including whole cells. However in case of bioaerosols MALDI-TOFMS involves sampling by deposition; the material has to be collected on a suitable substrate before it can be analyzed.

A joint effort of the TNO Defence, Security and Safety and Delft University of Technology has recently shown that it is possible, in principle, to apply real-time aerosol MALDI-TOFMS to bioaerosols (van Wuijckhuijse 2005). With the prototype instrument mass spectra can be obtained from single biological aerosol particles. The present paper describes recent results obtained with the prototype at TNO.

RESULTS

To characterize the discriminative power of the current state of the system two *Bacillus cereus* strains and the species: *B. cereus*, *B. thuringiensis* and *B. globigii* have been tested under several circumstances, like *e.g.* growth medium and culture age. The results of these tests are very promising since even strains of *Bacillus cereus* spores can be discriminated (Figure 1). Dependencies of the growth medium and sample age on the mass spectrum will be presented.

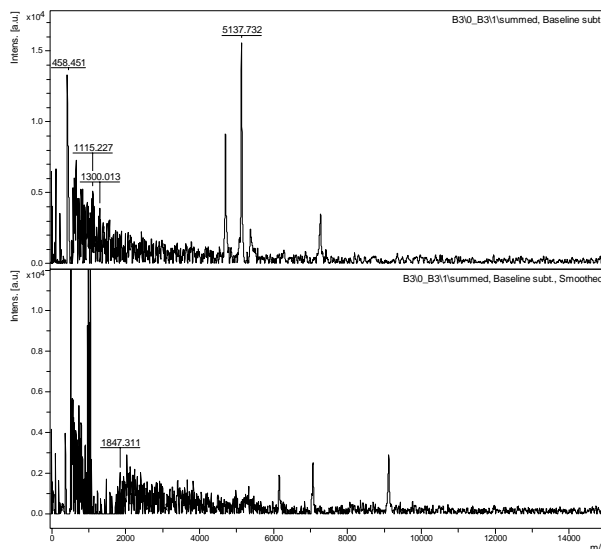


Figure 1: Real-time MALDI Aerosol ToF spectra of two *Bacillus cereus* strains

CONCLUSION

On-line MALDI Aerosol ToF Mass Spectrometry is able to discriminate among *Bacillus species*. Hereby the system offers the potential to be developed in the first specific near real time detector for bioaerosol agents.

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