Printing microarrays of bacteria for identification by IR

M.M. Mossoba[1], S.F. Al-Khaldi[2], J. Kirkwood[3], J. Sedman[3], A.A. Ismail[3], and F.S. Fry[1]

[1]Division of General Scientific Support, OSAS, [2]Division of Microbiological Studies, OPDFB, Center for Food Safety and Applied Nutrition, Food and Drug Administration, 5100 Paint Branch Parkway, College Park, MD 20740-3835 USA, [3]McGill IR Group, Dept. of Food Science and Agricultural Chemistry, McGill University, Montreal, Quebec, Canada H9X3V9

Fourier transform infrared (FTIR) spectroscopy has been established as a rapid bacteria identification technique. To optimize this procedure, the feasibility of applying contact deposition microarray technology to print intact bacterial cells as arrayed spots (150 μm diameter) on optical substrates and on agar slides was demonstrated for the first time. This contact deposition technology entails using a pin to deliver nanoliter (nL) droplets of bacterial suspensions from a microtiter plate onto a slide surface. Protocols for printing microarrays of whole-cells on agar and on infrared (IR)-transparent slides were evaluated and optimized for subsequent measurement by IR microspectroscopy and IR imaging. Parameters that were investigated included pin capacity, deposition mode, and spatial distribution of microarrays. Bacteria representing 8 genera (*Yersinia*, *Staphylococcus*, *Salmonella*, *Listeria*, *Enterobacter*, *Citrobacter*, *Klebsiella*, and *Escherichia)* were used in this proof-of-concept study. The resulting dendrograms generated by hierarchical cluster analysis (HCA) indicated clustering of the descendants of the foodborne bacteria investigated into their respective branches. The suitability of microarray printing coupled with focal-plane-array (FPA) detection FTIR imaging for the rapid identification of bacterial samples was demonstrated.