Electronic Supporting Information

Highly efficient enrichment and identification of pathogens by herringbone microfluidic chip and MALDI-TOF mass spectrometry

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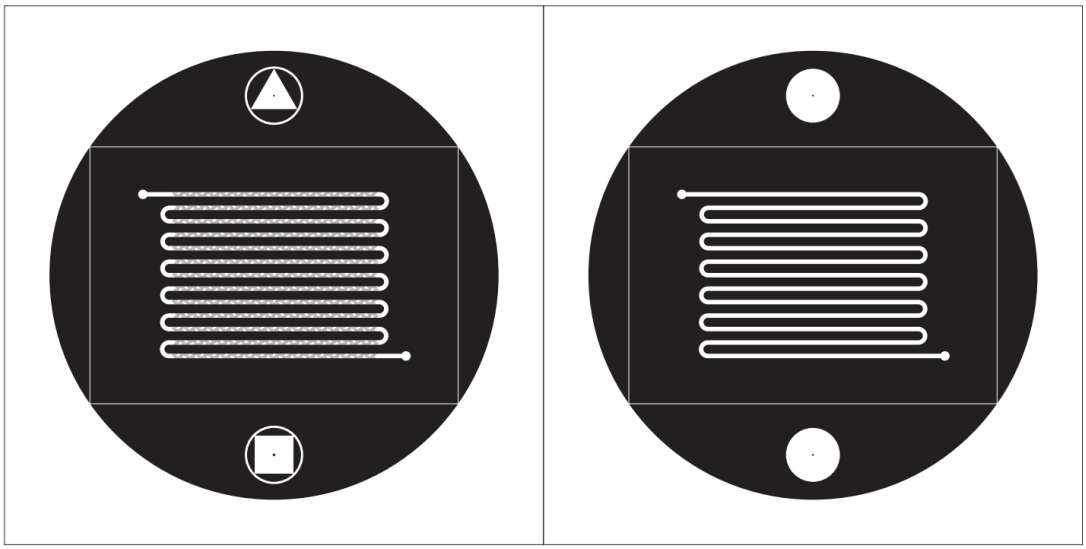

Fig. S1 Mask patterns of two layers of the herringbone microchip. A multilayer mold was prepared by stacking two patterned layers on a silicon wafer.

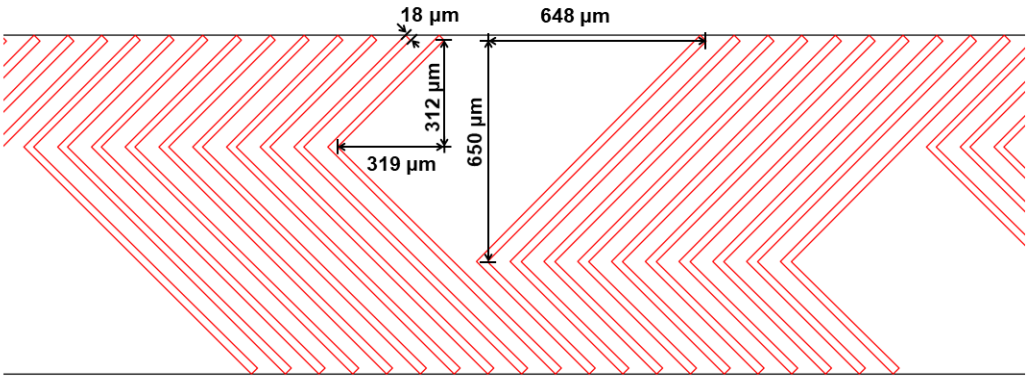

Fig. S2 Detailed patterns of one periodic unit of the herringbone microchip.

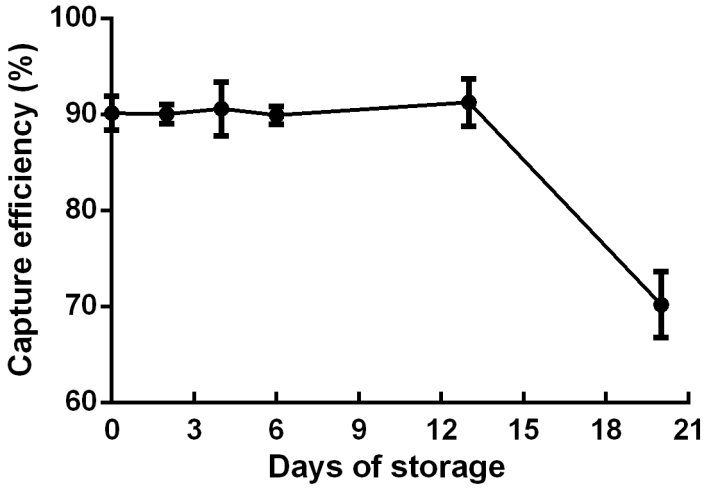

Fig. S3 Comparison of bacterial capture efficiency by the VMBs after different days of storage under 4 °C. 200 μL of 10^6 CFU/mL *S. aureus* were used for investigation of capture efficiency. Error bars indicate standard deviation from three replicates.

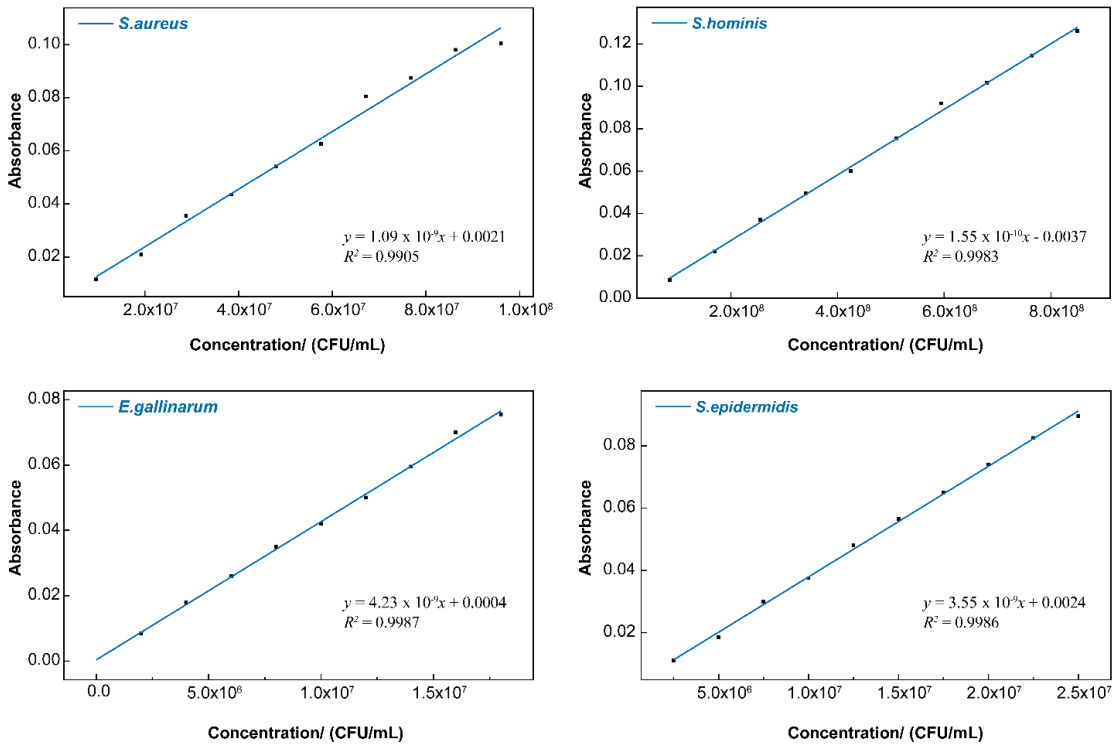

Fig. S4 Bacterial concentration-absorbance curve of *S. aureus*, *S. hominis*, *E. gallinarum* and *S. epidermidis*.

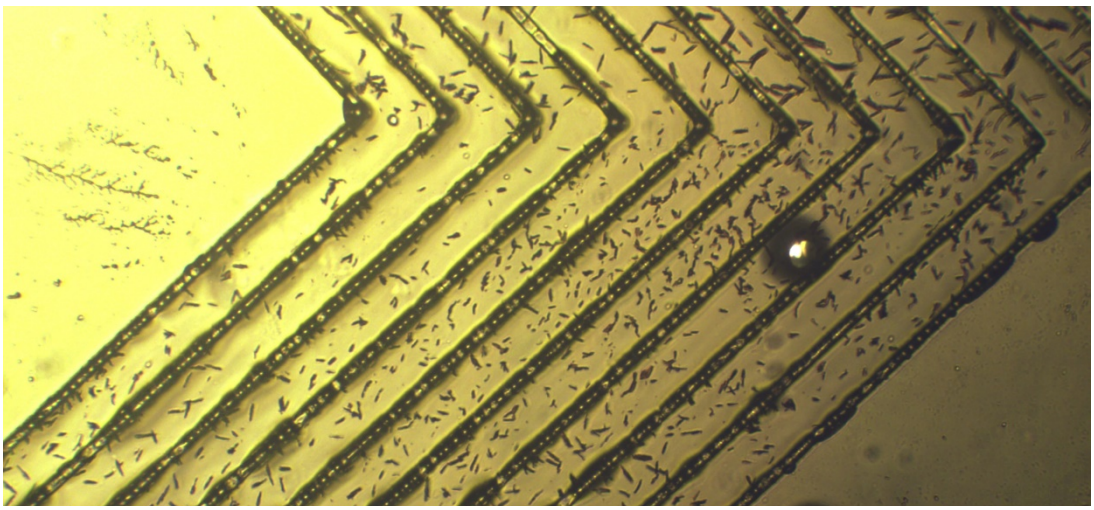

Fig. S5 Optical microscope picture of the dispersed VMBs in the herringbone microchip.

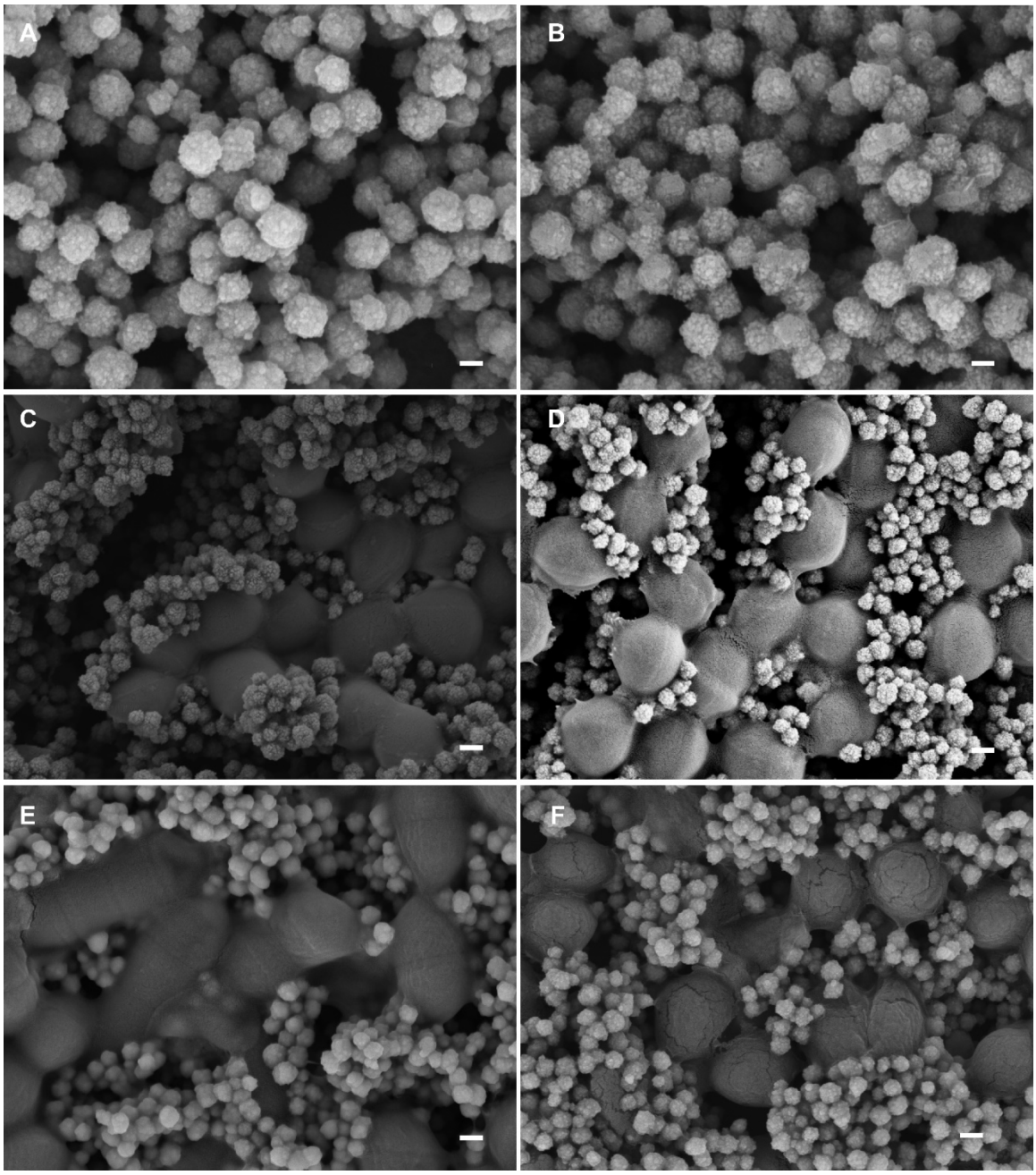

Fig. S6 SEM images of (A) GL-NH_2 magnetic beads, (B) VMBs, (C) VMB@*S. aureus*, (D) VMB@*S. hominis*, (E) VMB@*E. gallinarum*, and (F) VMB@*S. epidermidis*. The scale bar is 100 nm in (A) and (B) and 200 nm in (C)-(F).

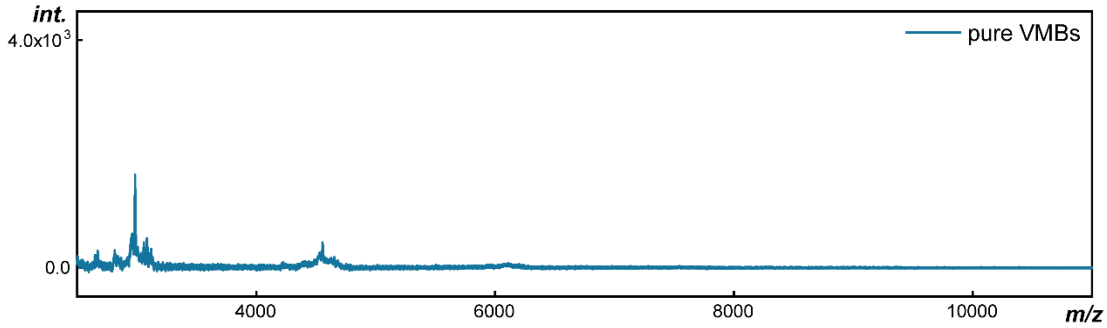

Fig. S7 MALDI-TOF mass spectrum of pure VMBs.

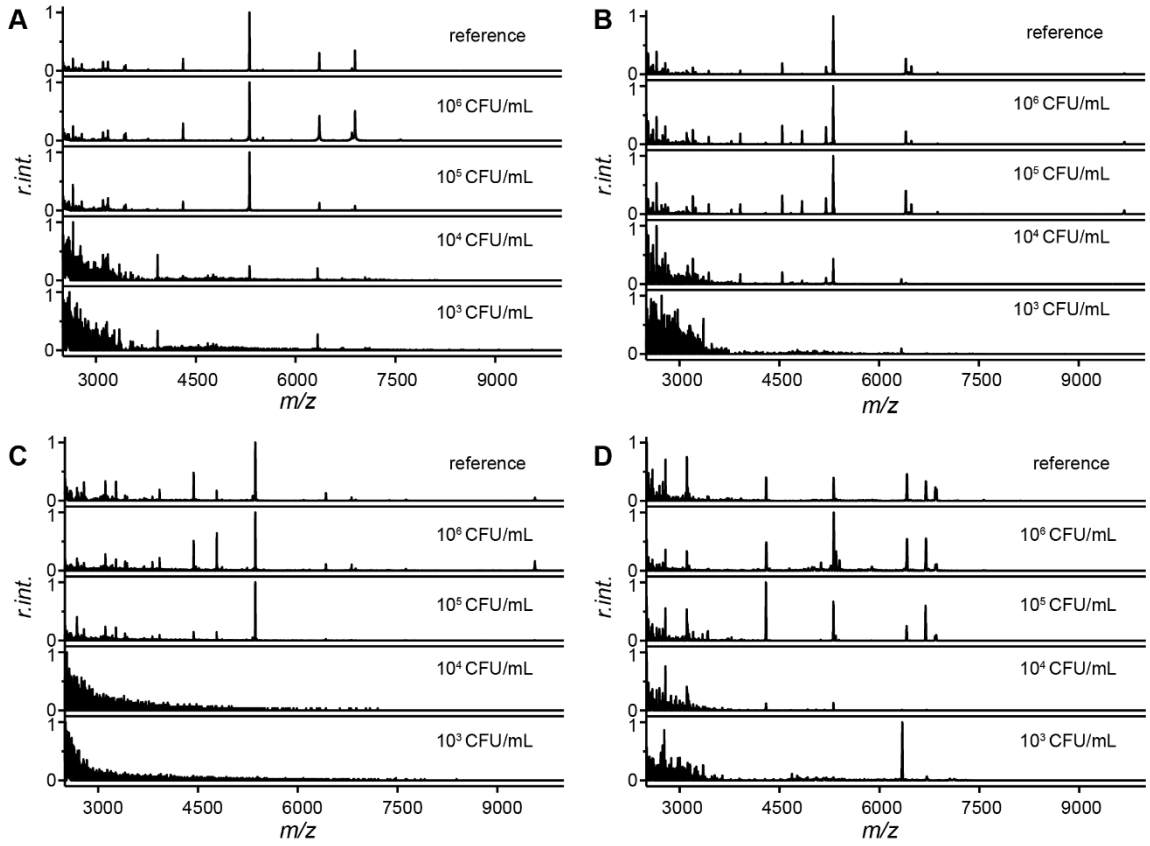

Fig. S8 MALDI-TOF mass spectra of the VMB@bacteria after the herringbone-VMB microchip extraction of bacteria from urine samples (10^6, 10^5, 10^4, 10^3 CFU/mL, 2.5 mL) compared to the reference spectra of the pure isolates of the corresponding strain. (A) *S. aureus*, (B) *S. hominis*, (C) *E. gallinarum*, and (D) *S. epidermidis*.

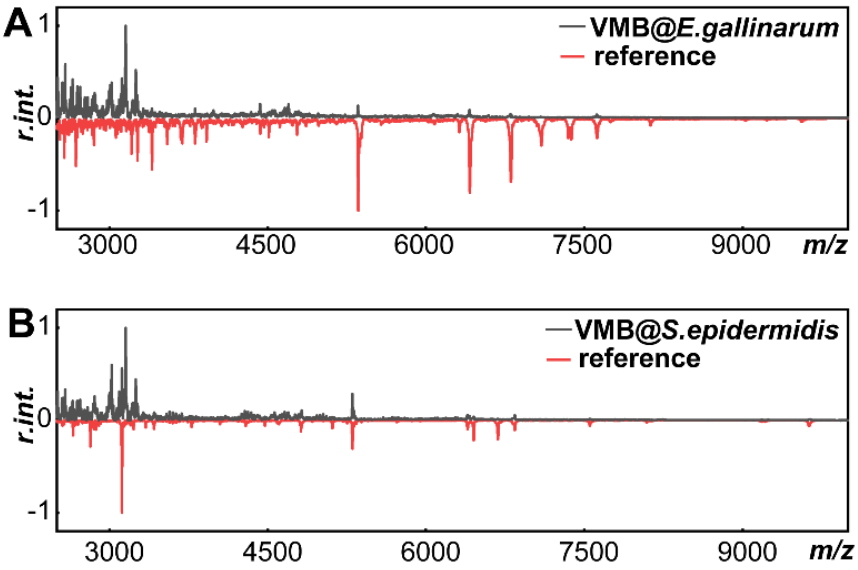

Fig. S9 MALDI-TOF mass spectra of the VMB@bacteria after in-tube bacteria extraction from urine samples (10^6 CFU/mL, 2.5 mL) compared to the reference spectra of the pure isolates of the corresponding strain. (A) *E. gallinarum* and (B) *S. epidermidis*.

Table S1 Capture efficiency and identification results of bacteria in urine samples by in-tube enrichment coupled MALDI-TOF MS.

Sample	Capture efficiency (%)	Identified strain	Identification score [b]	Confidence level
E.gallinarum in urine [a]	27.5%	*Nocardia yamanashiensis*	23.3	Medium
S.epidermidis in urine [a]	45.6%	*Mycobacterium tuberculosis*	20.9	Medium

a: 10^6 CFU/mL bacteria in urine, 2.5 mL.

b: The identification score is from the Clin-TOF II MALDI-TOF MS system. A score larger than 25 indicates confident identification.