Electronic Supplementary Material (ESI) for Nanoscale.

Supporting Information

Nanoprobe-based force spectroscopy as a versatile platform for probing the mechanical adhesion of bacteria

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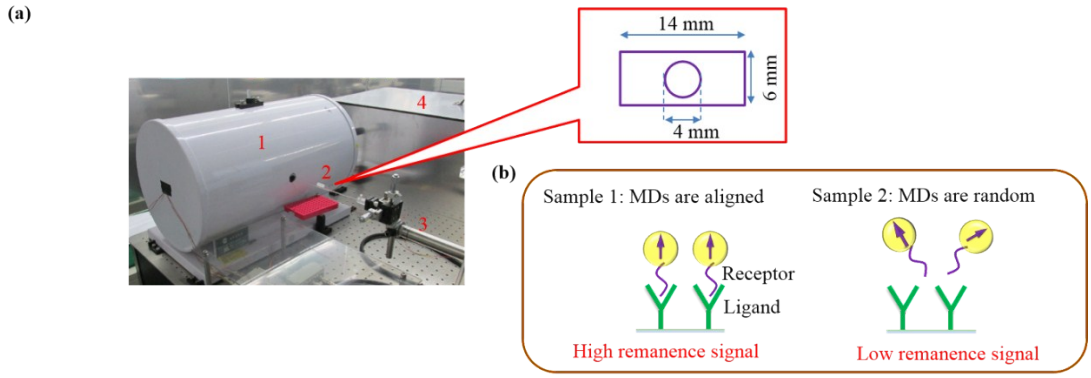

Fig. S1 (a) Experimental setup of FIRMS. 1: Magnetic shield that houses the atomic sensor; 2: Sample well, with dimensions shown in the callout box; 3: Linear actuator for sample scanning; 4: Enclosure for the optical components of the atomic magnetometer. (b) Schematic diagram of samples in sample well under different situation. MDs represents magnetic dipoles.

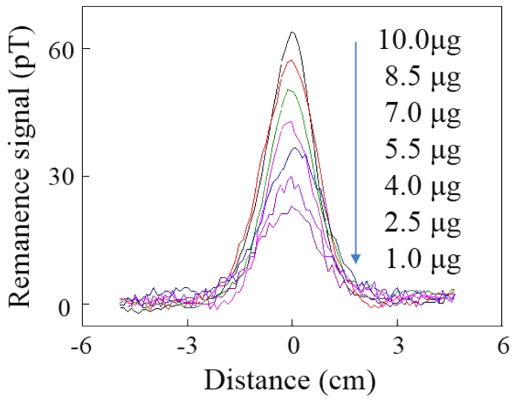

Fig. S2 Magnetic profiles of magnetic nanoparticles as a function of sample amount. The mass: from 1.0 μg to 10.0 μg.

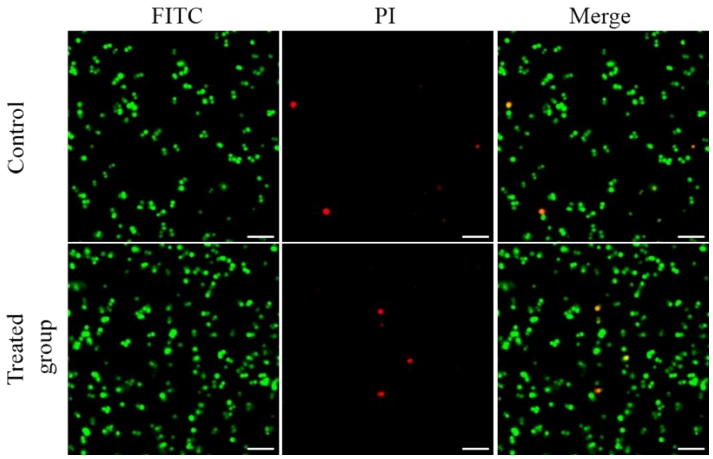

Fig. S3 Fluorescence images of *S. aureus* treated with PBS and 10 μg/mL NPs, respectively. The red represented the dead *S. aureus* stained with PI. The green represented all the cultured *S. aureus* stained with FITC. Scale bar, 5 μm.

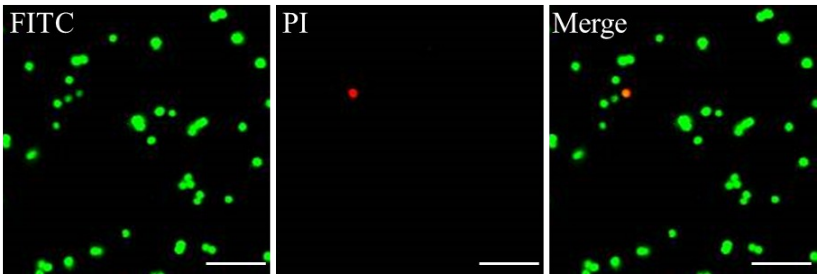

Fig. S4 Fluorescence images of *S. aureus* after FIRMS experiments. The red represented the dead *S. aureus* stained with PI. The green represented all the cultured *S. aureus* stained with FITC. Scale bar, 5 μm.

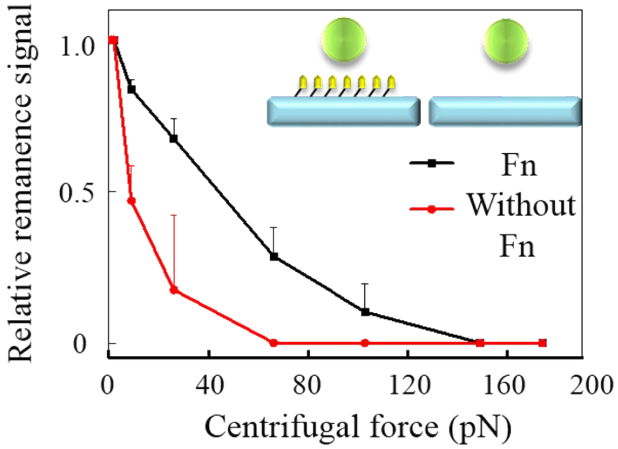

Fig. S5 Curves of force-dependent relative remanence signal decrease of magnetized *S. aureus* cultured on the substrates coated with Fn and without Fn, respectively. Data are mean ± s.d.. n = 3 replicates.

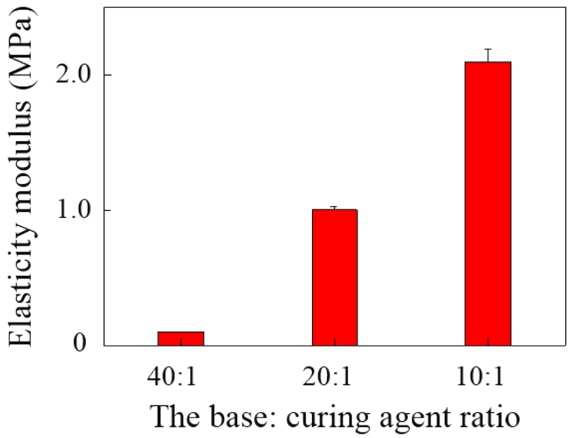

Fig. S6 The elasticity modulus of PDMS measured by using dynamic mechanical analysis (DMA). The elasticity modulus of 40:1, 20:1, 10:1 of PDMS are 0.1±0.02 MPa, 1.0±0.1 MPa, 2.1±0.1 MPa, respectively. Data are mean ± s.d.. n = 3 replicates.

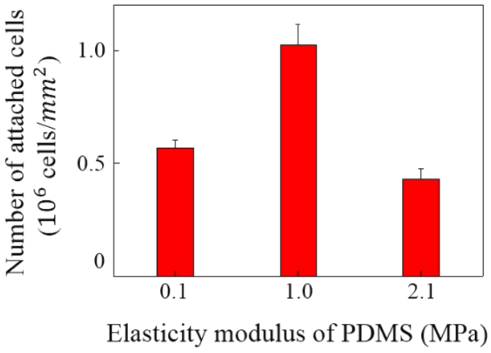

Fig. S7 Number of attached *S. aureus* cells cultured on PDMS surfaces with different stiffness. Using Image J software for statistical analysis. Data are mean ± s.d.. n = 3 replicates.

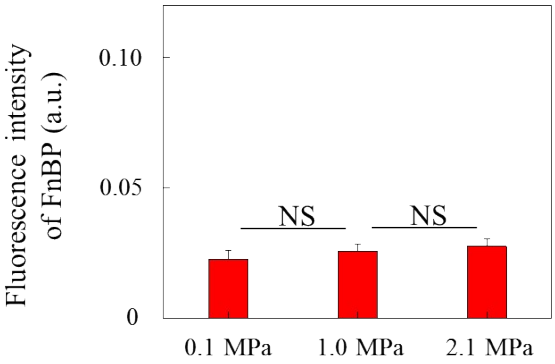

Fig. S8 Quantification of fluorescence intensity of FnBP on the surface of *S. aureus* cultured on PDMS substrates without Fn modification. n, ~200 cells per replicate. NS, not significant, Student's-test. Data are mean ± s.d.. n = 3 replicates.

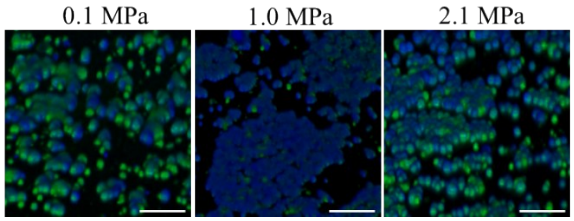

Fig. S9 Fluorescence images of *S. aureus* after 24 h incubation on surface of substrates with different stiffness. Scale bar, 5 μm. *S. aureus* are green-fluorescent (stained by SYTO 9, a green-fluorescent nucleic acid stain) while EPS shows calcofluor-white blue fluorescence (stained by fluorescent Brightener 28, calcofluor-white, a blue-fluorescent stain).