Supporting Information

Broad-spectrum antimicrobial effects of hydrogen boride nanosheets

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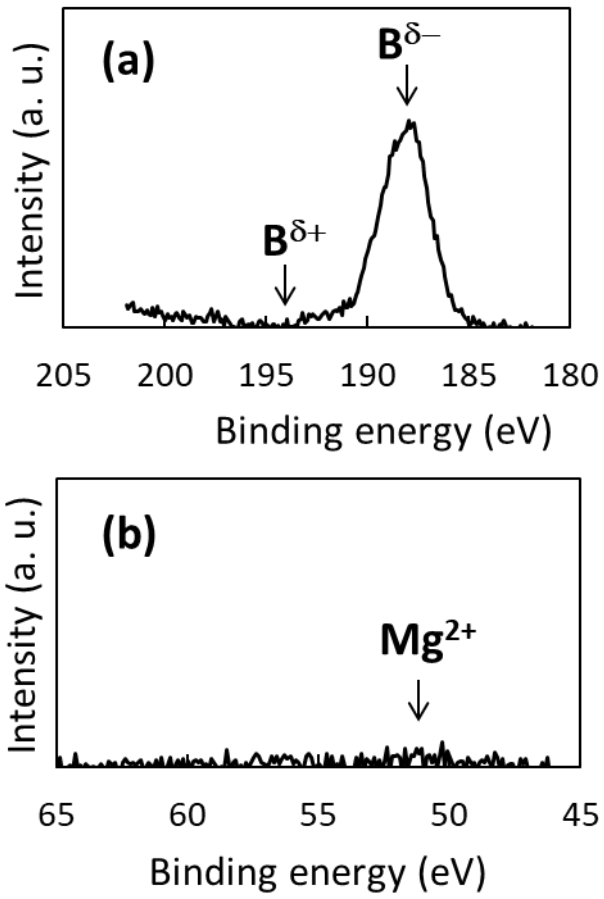

Fig. S1. XPS spectra of HB nanosheets for boron 1s (a) and magnesium 2p (b) orbitals.

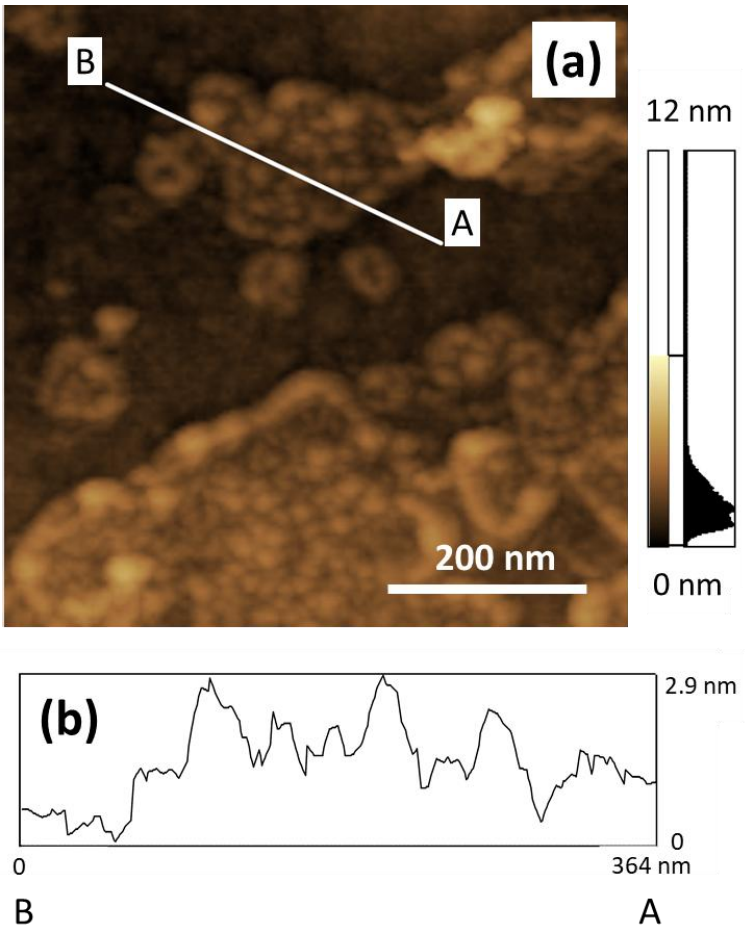

Fig. S2. AFM image of HB nanosheets coated on an atomically flat mica substrate (a). Panel (b) shows the height profile of the line (A-B) indicated in panel (a).

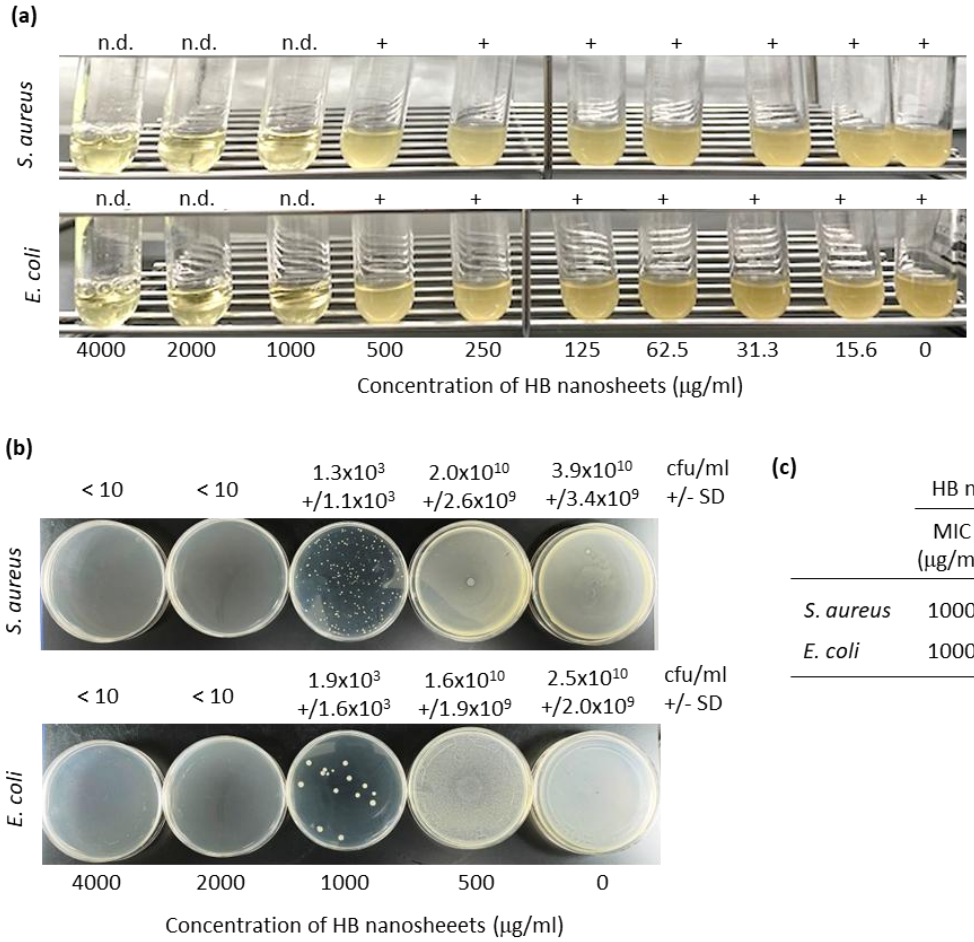

Fig. S3. Determination of the minimum inhibitory concentration (MIC) and the minimum bactericidal concentration (MBC). *S. aureus* and *E. coli* were cultured in Mueller Hinton broth with or without HB nanosheets at respective concentration for 24 hours to determine MIC. After cultivation, bacterial growth was visually observed (n.d. means "not detected", + means bacterial growth) (a). 0.1 ml of these cultured broth (from 4000 to 500 and 0 mg/ml of HB nanosheets) were cultured on the agar plates to determine MBC. At the same time bacterial concentration was determined by serial dilution method (b). MIC and MBC of HB nanosheets for *S. aureus* and *E. coli* were determined on the basis of the result (a) and (b) respectively as shown in table (c).

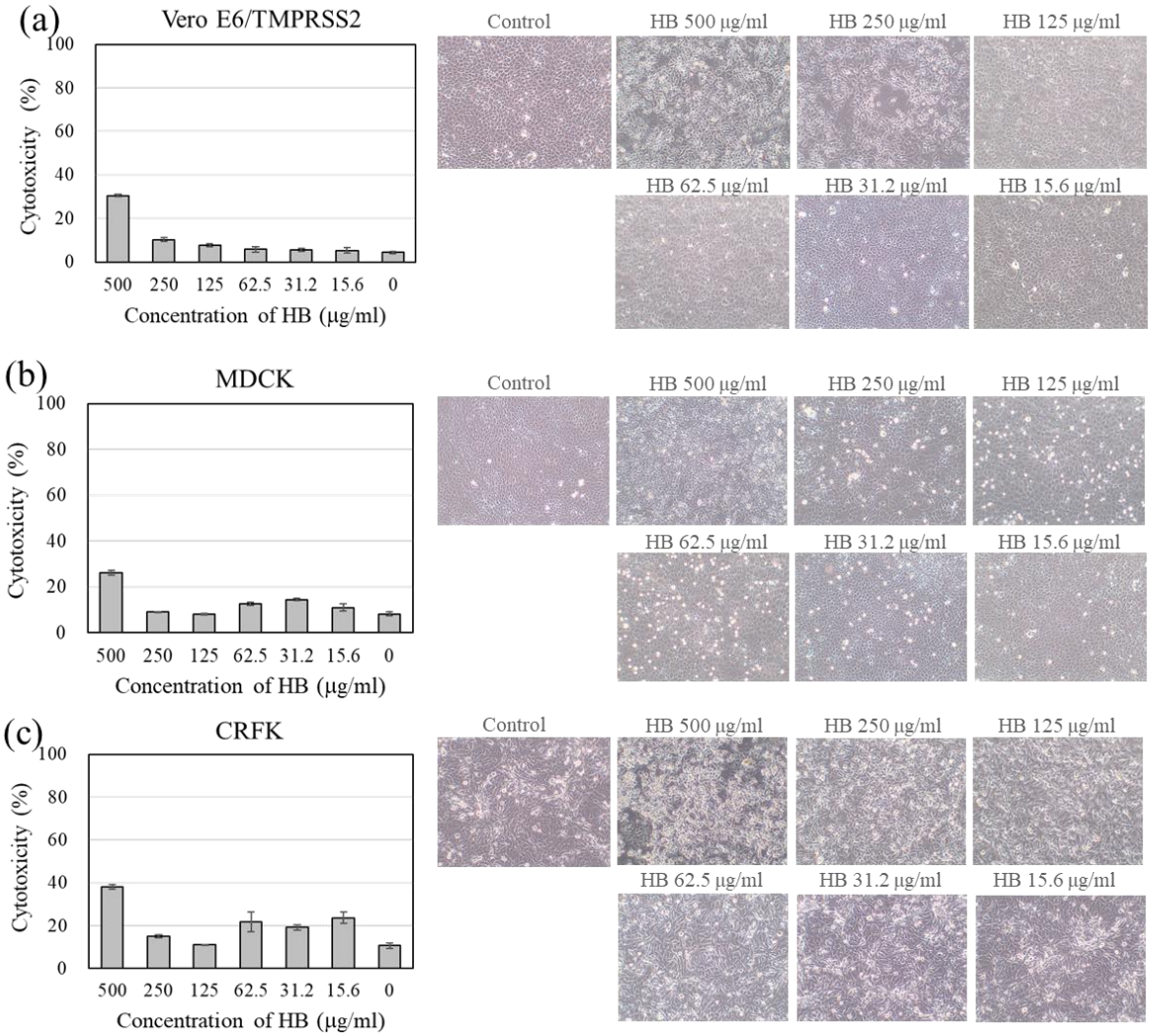

Fig. S4. Cytotoxic assay of HB nanosheets for cell lines. The cytotoxicity for Vero /TMPRSS2 (a), MDCK (b) and CRFK (c) treated with HB nanosheets at respective concentrations for 24 h is shown in the left graphs. The photos of these cells are shown in right panel at that time.

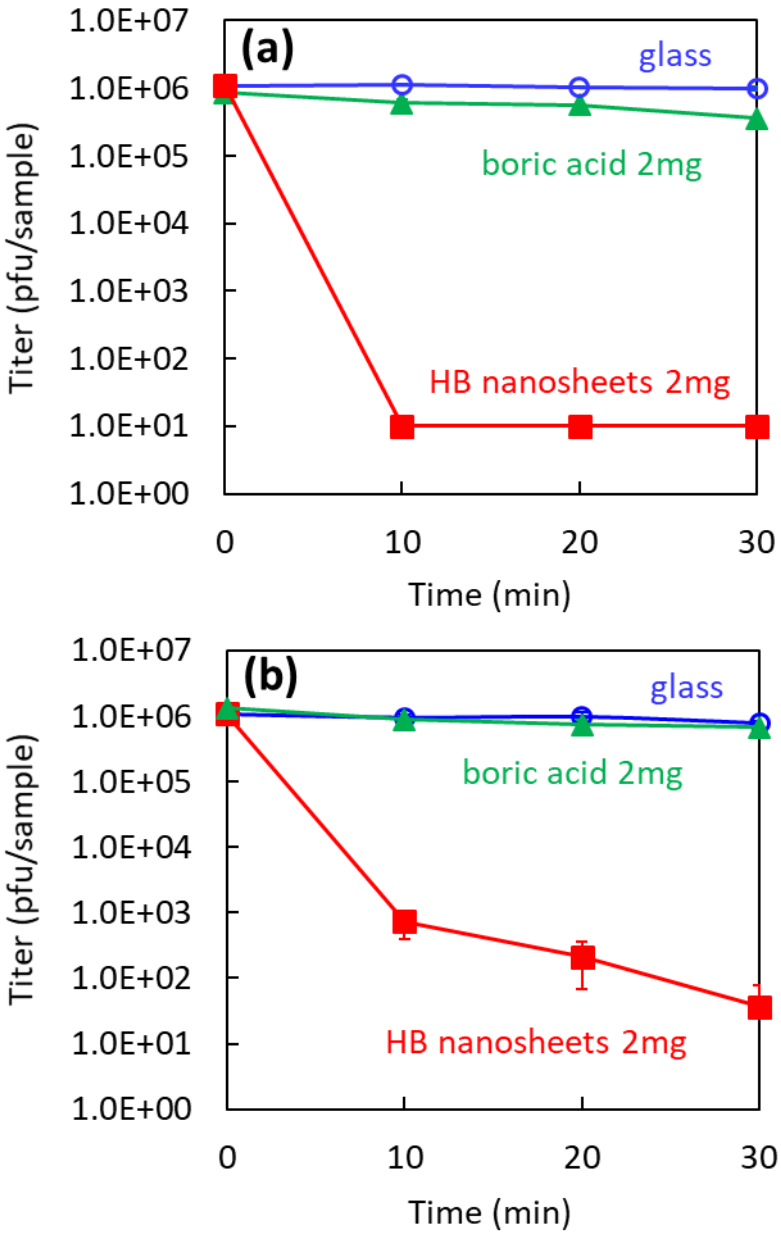

Fig. S5. Titer of bacteriophage Φ6 (a) and bacteriophage Qβ (b) as a function of exposure time to the thin film of HB nanosheets (red squares), boric acid (green triangles), a bare glass substrate (blue circles).

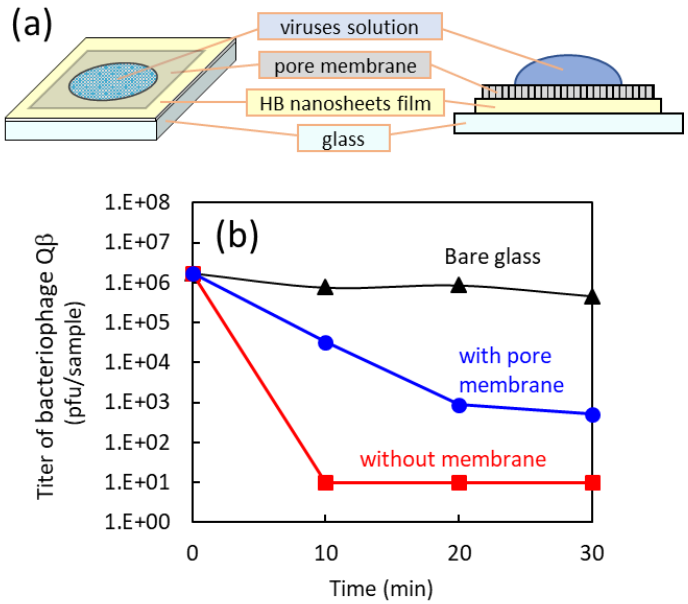

Fig. S6. Schematic illustration of the antiviral test method using a pore membrane (a). Titer of bacteriophage Qβ under the exposure to the HB nanosheet-film without pore membrane (red), HB nanosheet-film with pore membrane (blue), and bare glass (black), respectively (b). The pore size of the membrane is 0.025 μm, which is smaller than the size of bacteriophage Qβ (about 0.03 μm). Under this experimental condition, bacteriophage Qβ would not be passed through the membrane, but leached ions could be passed.