Electronic Supplementary Material (ESI) for Sensors & Diagnostics.

FAST AND ACCURATE IDENTIFICATION OF PATHOGENIC BACTERIA USING EXCITATION-EMISSION FLUORESCENCE SPECTROSCOPY AND MACHINE LEARNING

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SUPPLEMENTARY INFORMATION

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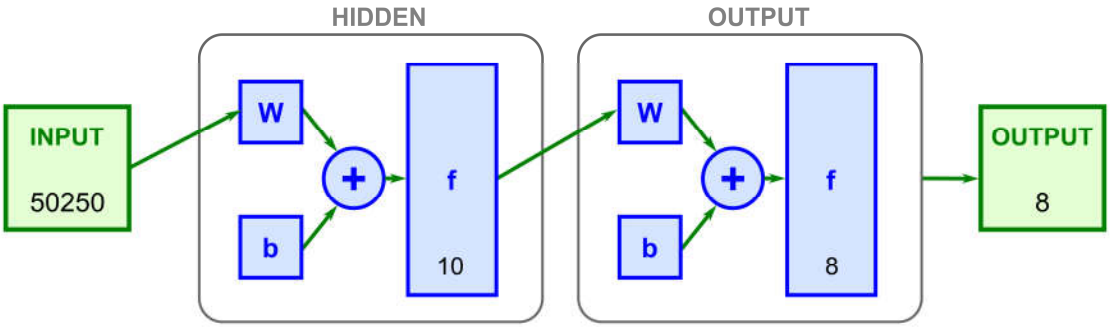

Figure S1. Architecture of the convolutional neural network used for bacterial pathogens classification.

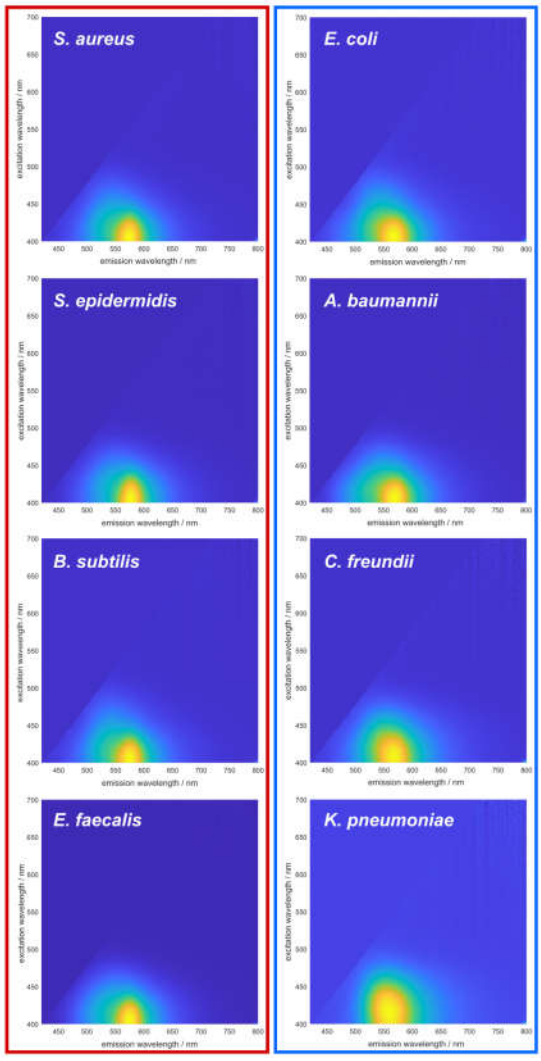

Figure S2. Excitation-emission spectra of Gram-positive (left) and Gram-negative (right) bacteria exhibit distinct Gram-status-specific shape patterns: for the Gram-negative microorganisms, fluorescence is shifted to the area of hydrogen-bonded complex emission (around 540-550 nm) and farther into longer-wavelength excitation (past 440-450 nm).

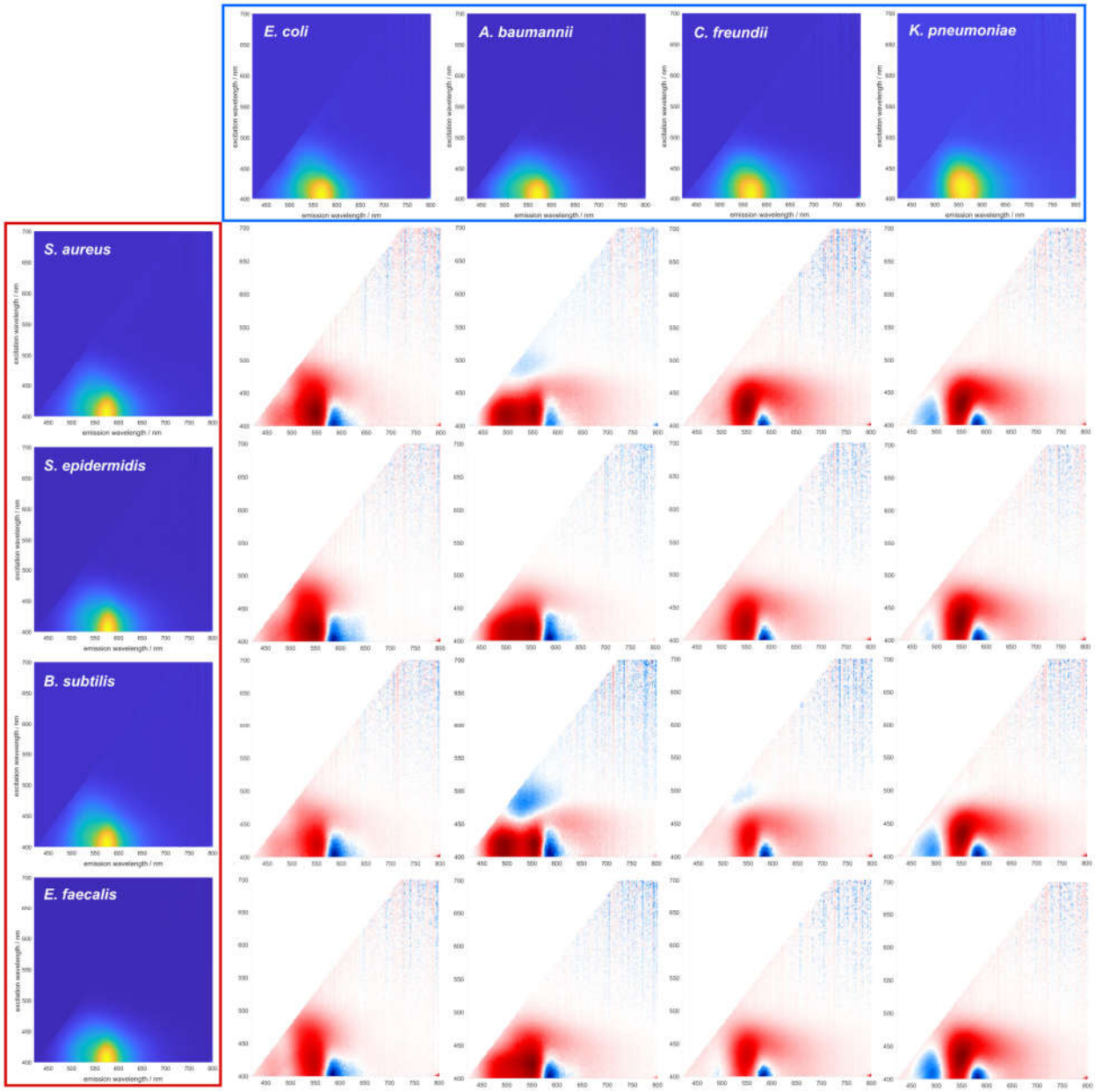

Figure S3. Excitation-emission spectra of Gram-positive and Gram-negative bacteria and the difference matrices illustrating the signals of Gram(+) bacteria subtracted from those of Gram(-) bacteria. A common pattern is observed where the emission intensity redistributes to the shorter wavelengths (red color = increase of intensity) and towards longer excitation wavelengths. At the same time, a decrease of intensity is observed in the area of the tautomeric fluorescence of DMAF (blue color).

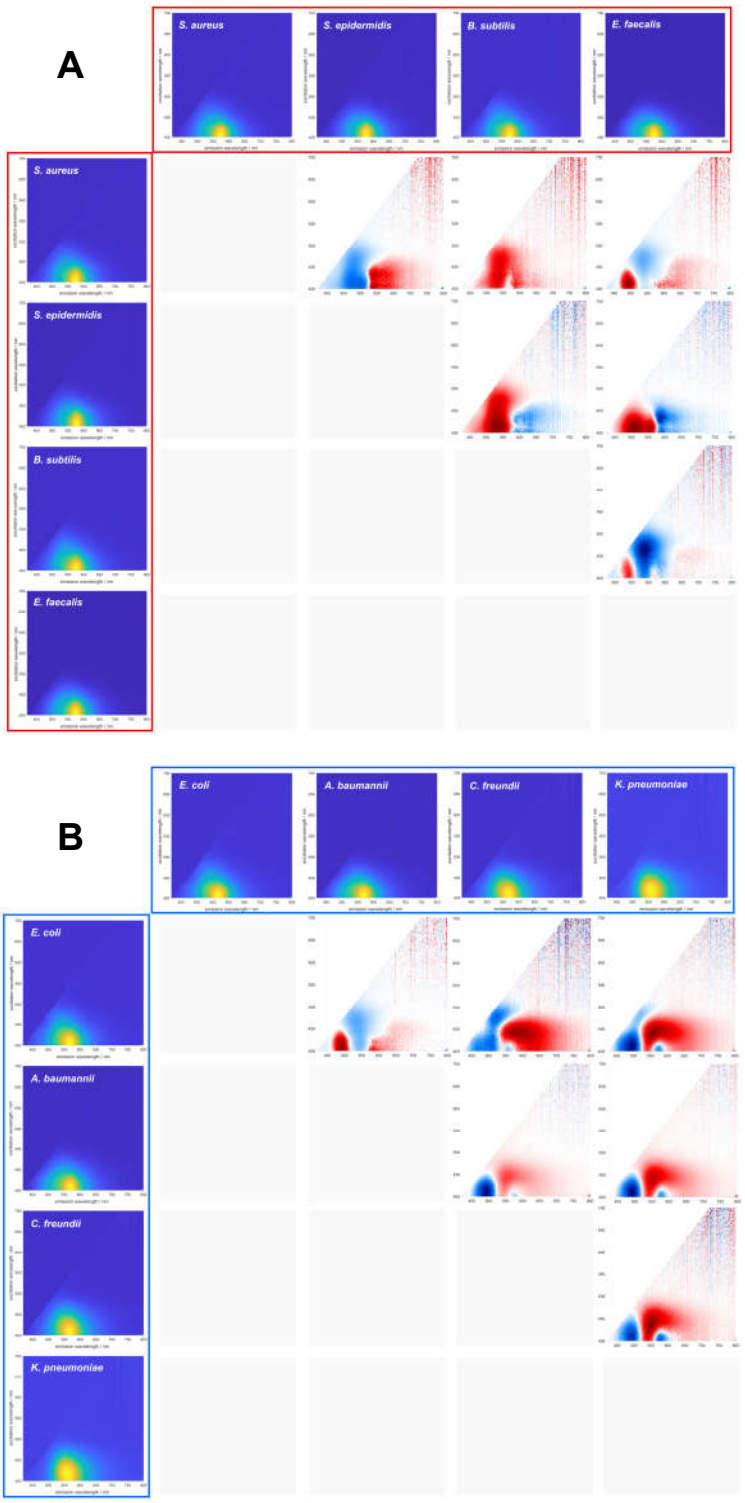

Figure S4. Difference spectra between Gram positive (A) and Gram-negative (B) bacteria illustrate more intricate variations in the excitation-emission signal within a group of bacteria representing the same Gram status, lacking a common trend that dominates the transition from Gram(+) to Gram(-) samples shown in Figure S2.

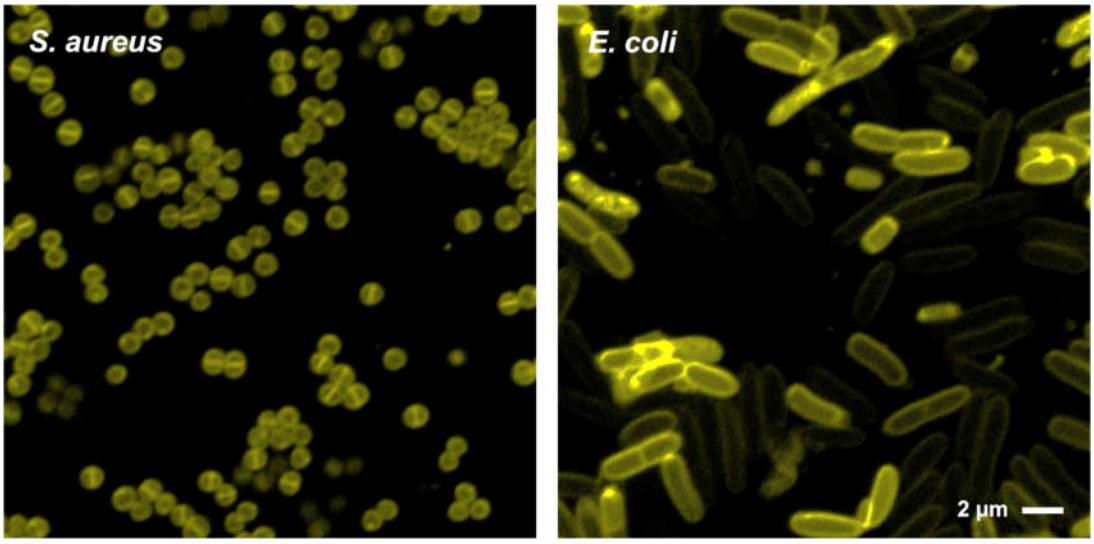

Figure S5. Confocal fluorescence microscopy of representative bacteria (*S. aureus* and *E. coli*) stained with DMAF confirms its localization in the cell envelope.

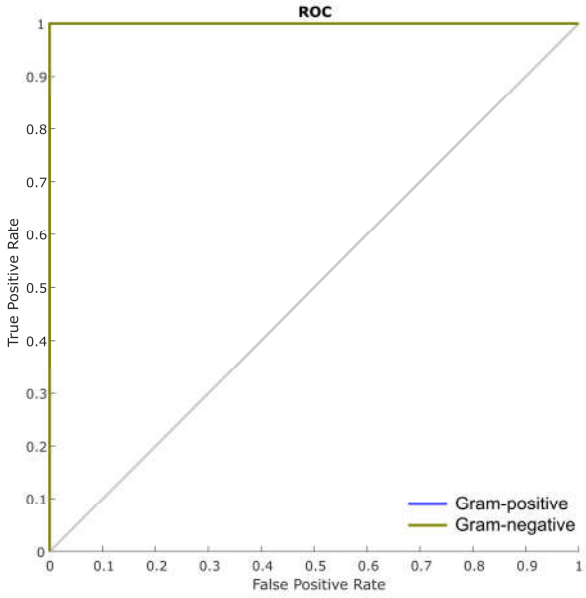

Figure S6. The receiver operating characteristic curve for the Gram status classification model.