Electronic Supplementary Material (ESI) for Environmental Science: Water Research & Technology.

Supporting Information (8 pages)

Inexpensive microbial dipstick diagnostic for nitrate in water

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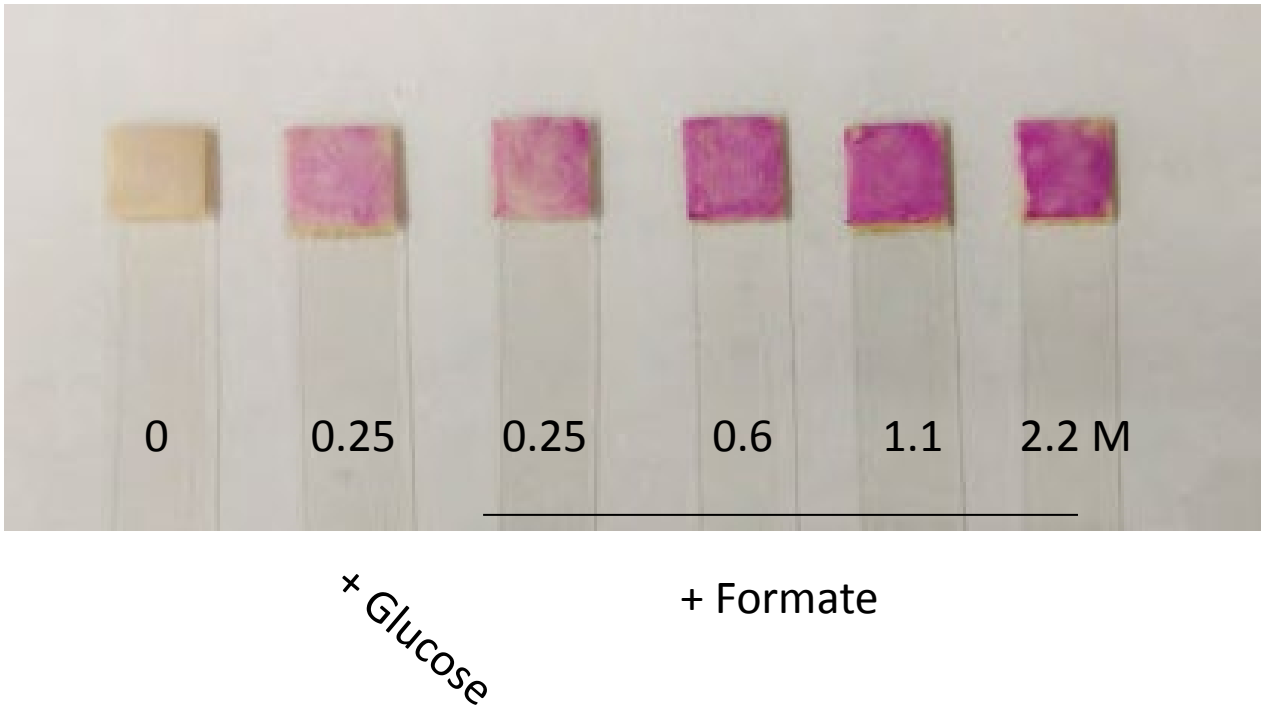
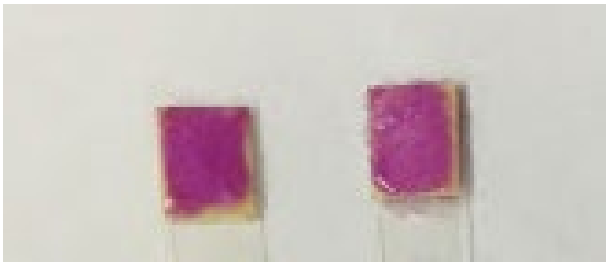


Figure S1. Comparison of glucose and formate carbon sources for nitrate reduction. Equal molar glucose and formate give similar nitrate signals despite glucose providing 6 times more electrons than formate at the same molar concentration. The bio-strips assayed with 10 ppm NO_3^--N.



NO_2^--N 10 ppm NO_3^--N 10 ppm

Figure S2. Stochiometric reduction of nitrate (10ppm) by *E. coli* with subsequent detection of nitrite using Griess reagents. Formate (150 mg/mL drying solution) was dried with the cells on the paper strips (5 µl per strip). On the left, 10 ppm NO_2^--N was added to the bio-strip for color intensity comparison.

A.

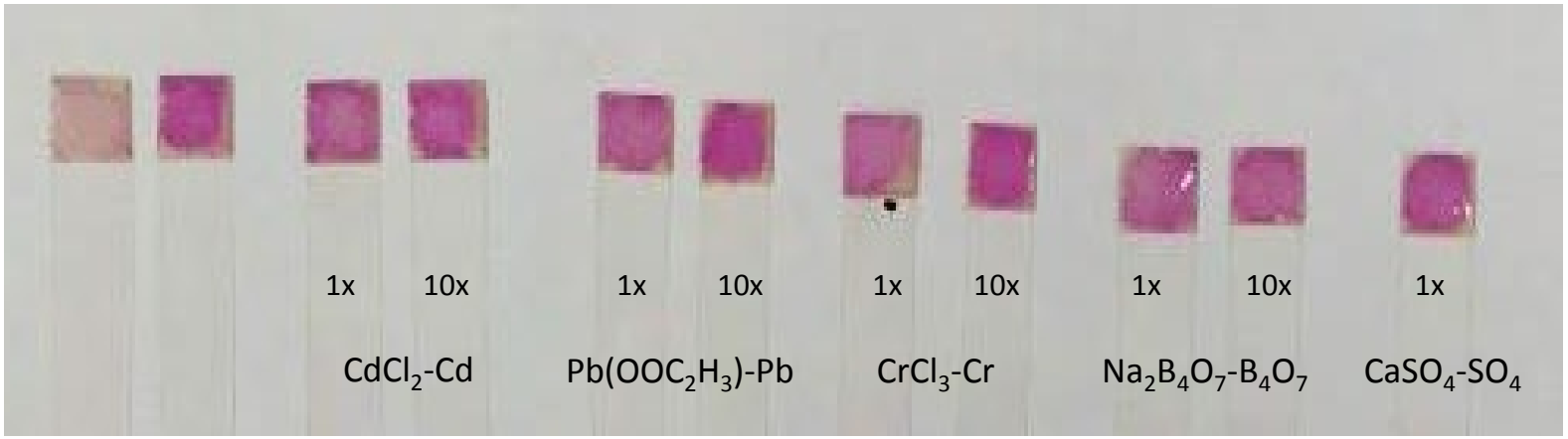
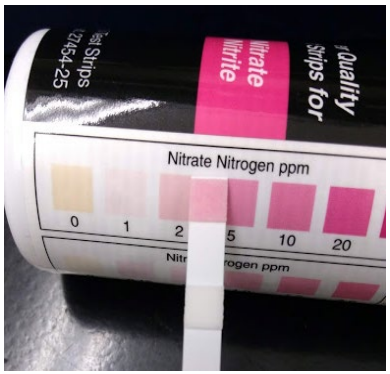


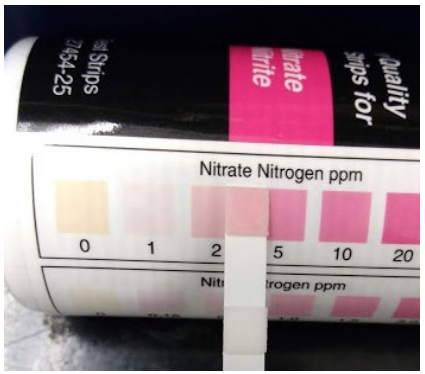
Figure S3(A). Effect of heavy metals and other potential water contaminants on nitrate bio-strips. Compounds were tested at the following concentrations with 5 ppm NO_3^- - N: Cadmium chloride, 5 and 50 ppb; lead acetate, 10 and 100 ppb; chromium chloride, 0.1 and 1 ppm; sodium borate, 3 and 30 ppm; and calcium sulfate 250 ppm.

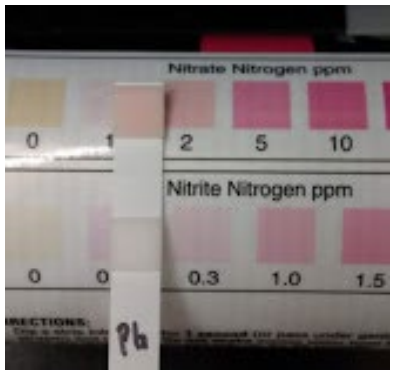
B.

$Pb(OOC_2H_3)$-Pb (ppm)	0	0.1	0.5	5	0
NO_3^--N (ppm)	5	5	5	5	0

C.







$Pb(OOC_2H_3)$-Pb (ppm) all 5 ppm NO_3^--N

0.1 0.5 5

Figure S3. Effect of lead acetate 0.1 to 5 ppm on (B) nitrate bio-strip and (C) Aquachek nitrate strip.

0 ppm 10 ppm NO_3-N

Figure S4. Activity of nitrate bio-strips incubated under heat shock conditions (46 ^{o}C with 25% humidity) for 17 hours. The drying matrix had carbon (20% trehalose, 2.2 M formate) nitrogen (1 g/L NH_4Cl) and phosphate (10 mM Na_2HPO_4). Bio-strips were exposed to 0 or 10 ppm nitrate.

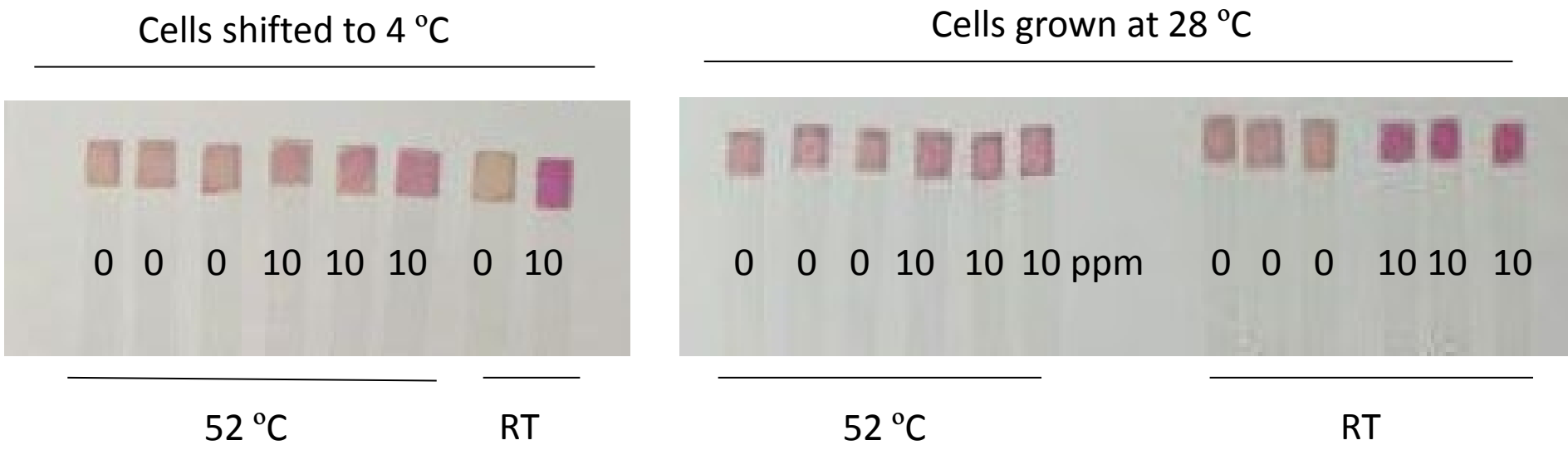


Figure S5. Activity of nitrate bio-strips made with cold shock cells. Cells were either grown at 28 °C only or shifted to 4 °C for 4 hr. before harvest. The strips were incubated for 17 hours at 52 °C or room temperature (RT) as indicated below the strips. Strips were exposed to 0 or 10 ppm NO_3^- - N. The nitrate signal for both cell growth conditions was the same within error.

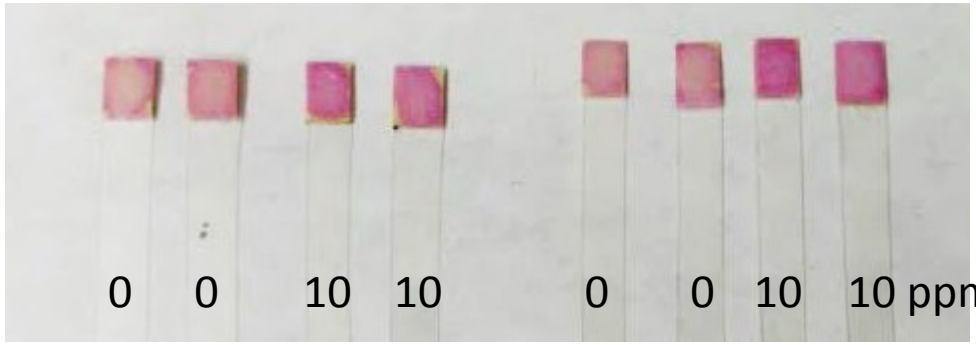


Figure S6. Activity of nitrate bio-strips made with cells grown in high salt stress conditions. Cells were grown in tryptone nitrate broth with or without 0.3M NaCl. The strips were incubated for 17 hours at 52 °C. Strips were exposed to 0 or 10 ppm NO_3^- - N.