



**Fig. S4. Adaptable pH and temperature for cell growth of *Burkholderia* N<sub>2</sub>O emitters**

To examine their growth characteristics, each bacterium was static-cultured in 5 ml MW liquid medium in a 18-cm test tube in triplicate. The ingredients of the liquid medium was the same as that used for the culture-based N<sub>2</sub>O emission assay, except for gellan gum powders removed from the liquid medium. We examined cell growth performance of each bacterium in triplicate at 15 °C and 25 °C (both at pH 5.0), and also at pH 5.0 and 7.0 (both at 15 °C) respectively. After vortexed briefly at day 5, a 200 µL portion of the culture medium was poured into a well of a 96-well dish (Costar 3599, Corning Inc., New York, USA) and OD values was measured at 660 nm by using a Microplate Reader, Sunrise™ (Tecan, Männedorf, Switzerland).

After the 5-day-incubation, *Burkholderia* sp. SF-A1 and *B. phenazinium* SF-C1 showed similar cell growth performances without any statistic significance between those incubated at 15 °C and 25 °C. Conversely, *Burkholderia* sp. SF-E2 exhibited 1.3 times higher turbidity at 25 °C than that cultured at 15 °C at day 5. At day 7, however, all the N<sub>2</sub>O emitters cultured at 25 °C showed better cell growth than those cultured at 15 °C. Consequently, all the bacteria of *Burkholderia* are mesophile, and *Burkholderia* sp. SF-E2 is particularly adaptable for relatively high temperature.

In addition, all the N<sub>2</sub>O emitters of *Burkholderia* showed 1.5-2.0 times higher cell growth at pH 5.0 compare to those cultured at pH 7.0, suggesting that all are also adapted for weakly acidic conditions of sphagnum moss tissues. Although the turbidity of the culture was almost the same level at pH 7.0 (OD<sub>660</sub> 0.183-0.189 for three isolates at day 7), *Burkholderia* sp. SF-E2 at pH 5.0 showed the best cell growth performance that is 2.0 times higher than that cultured at pH 7.0. In parallel with this cell growth promotion under a weakly acidic condition, 7-day-incubated *Burkholderia* sp. SF-E2 showed 1.7 times higher N<sub>2</sub>O emission at pH 5.0 than that cultured at pH 7.0 (note Fig. 3A). Taken together, all the N<sub>2</sub>O emitters isolated from *S. fuscum* are likely to show an acidophilic property with high adaptation for weakly acidic environments of *Sphagnum* bogs. \*\* *P* < 0.01, \*\*\* *P* < 0.001.