

## Description of Additional Supplementary Files

**File Name: Supplementary Video 1.**

**Description: Microcolony growth in a particle over 24 h.** *Pseudomonas aeruginosa* PAO1 (both NarK-GFP and NirS-dsRed strains, in equal portions) were embedded in an agarose particle disc (3 mm diameter) and incubated in a gastight millifluidic device. LB media supplemented with NO<sub>3</sub><sup>-</sup> (1 mM) continually flowed past the particle at a velocity of ~0.7 mm s<sup>-1</sup>. Images were acquired every 30 min. Scale bar = 750 μm.

**File Name: Supplementary Data S1**

**Description:** The data underlying Fig. 1.

**File Name: Supplementary Data S2**

**Description:** The data underlying Figs. 3 and 4 and Supplementary Figs. 5–8.

**File Name: Supplementary Data S3**

**Description:** The data underlying Fig. 2 and Supplementary Fig. 4.

**File Name: Supplementary Data S4**

**Description:** The data underlying Fig. 5.