**Supporting Information**

# *Nepenthes*-inspired Multifunctional Nanoblades with Mechanical Bactericidal, Self-cleaning and Insect Anti-adhesive Characteristics

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**KEYWORDS** *Bio-inspired; Nanoblade; Mechanical bactericidal activity; Insect nonadhesive; Self-cleaning*.

## Contents:

**A: The bactericidal performance of peristome surface of the *Nepenthes alata* pitcher**

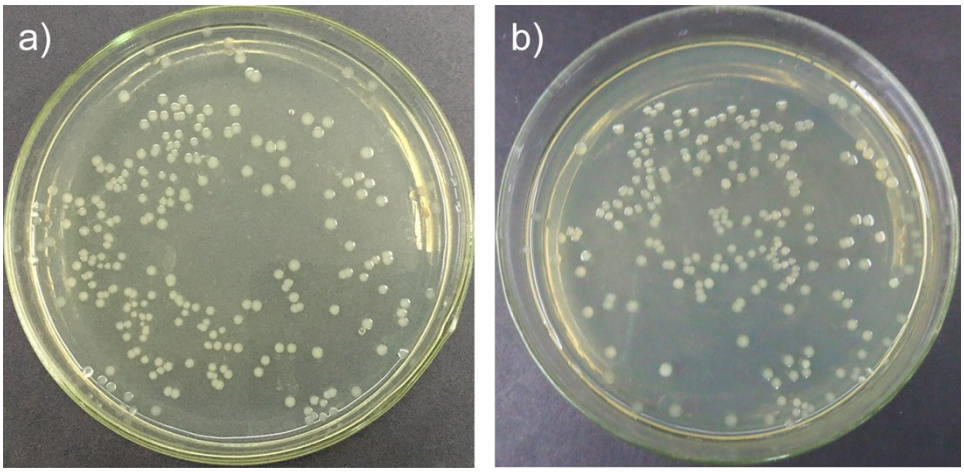


**Figure S1.** Optical images of the colony count of *E. coli* incubated with peristome of *Nepenthes* for 10 min. a) glass slide, b) peristome of *Nepenthes*.

**B: Difference in $\cdot O_2^-$ and $H_2O_2$ productivity of NNBs and CNNBs in dark**

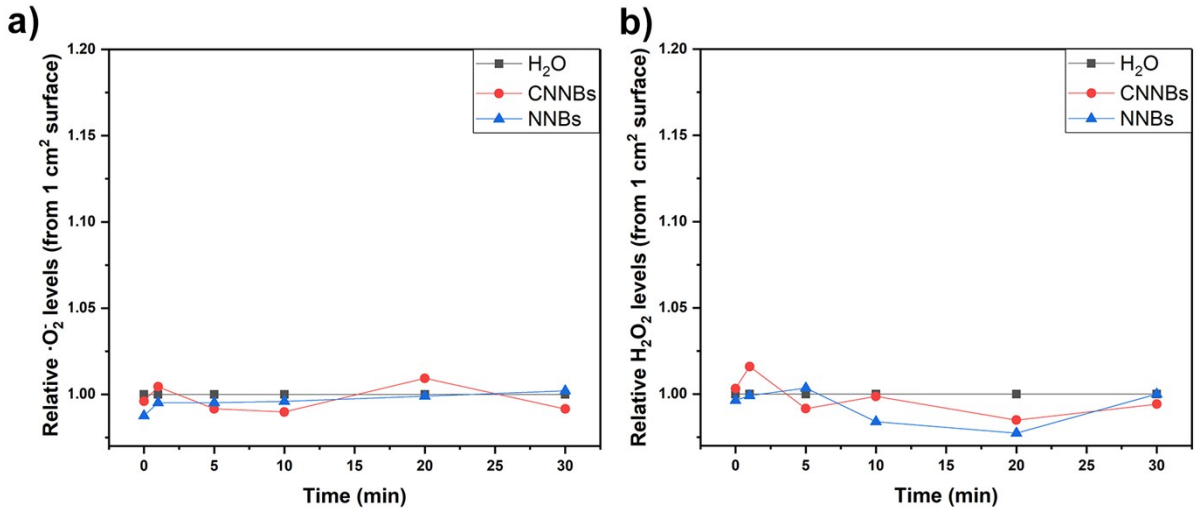


**Figure S2.** Production of $\cdot O_2^-$ and $H_2O_2$ of NNBs and CNNBs as the function of time.

A superoxide assay kit was used to compare the difference productivity of $\cdot O_2^-$. The absorbance at 450 nm of formazan compounds indicated the concentation of $\cdot O_2^-$ by the NNBs is very closed to that of $H_2O$ and CNNBs samples, indicating $\cdot O_2^-$ is not the major factor responsible for the as-observed bactericidal behavior. Similarly, a hydrogen peroxide kit was used to compare the productivity of $H_2O_2$ of these samples. The absorbance at 560 nm of $Fe^{3+}$-xylenol orange compounds indicated the concentation of $H_2O_2$ by the samples is also very closed, showing $H_2O_2$ is not the major factor responsible for the as-observed bactericidal behavior.

**C: Interaction between bacteria cells and NNBs surface**

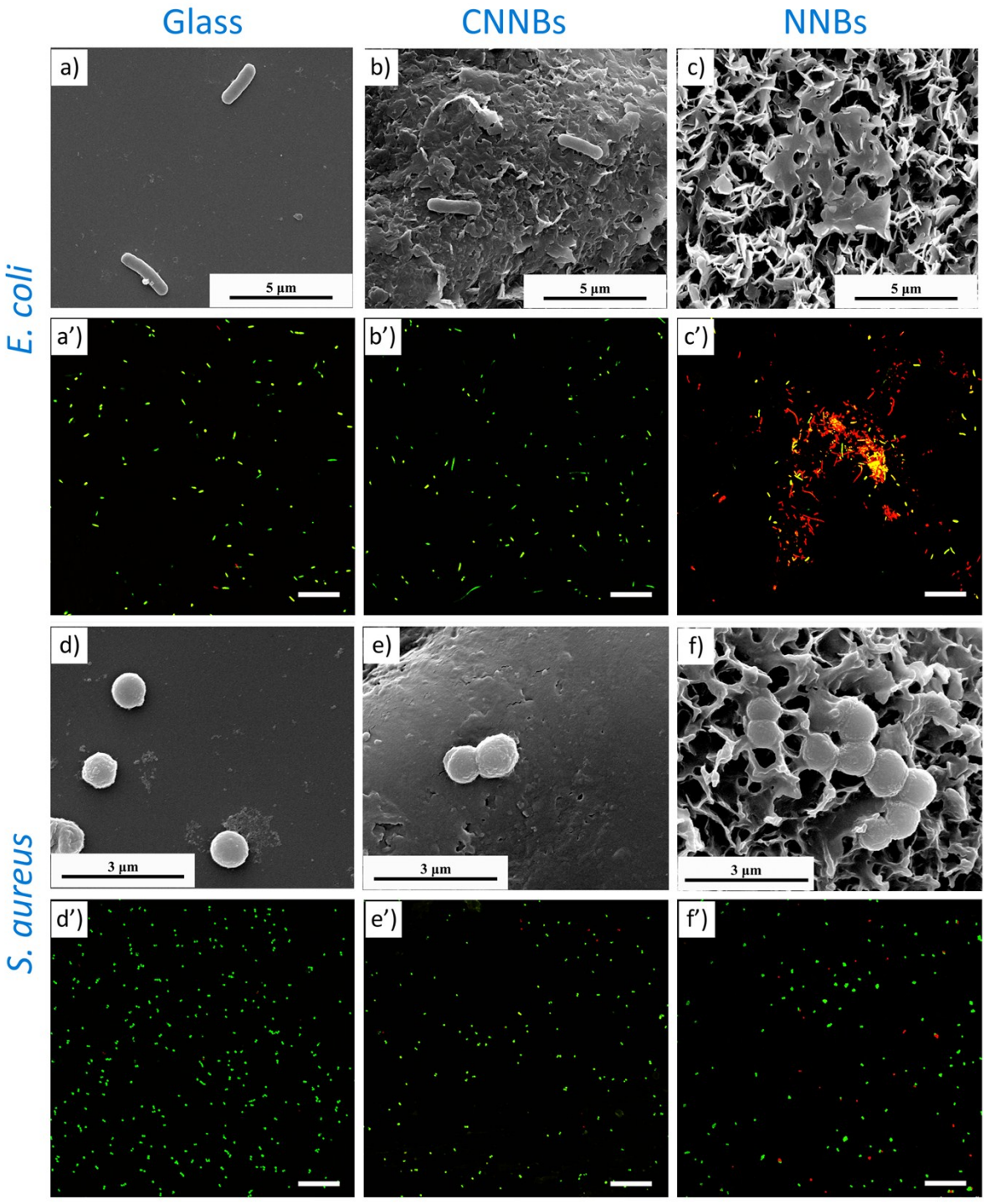


**Figure S3.** Interaction between bacteria cells and NNBs surface. *E. coli* and *S. aureus* cells on glass, CNNBs and NNBs after 10 min contact. a-f) SEM image, a'-f') CLSM image.

**D: The topography change of ANBs prepared with different growth temperature**

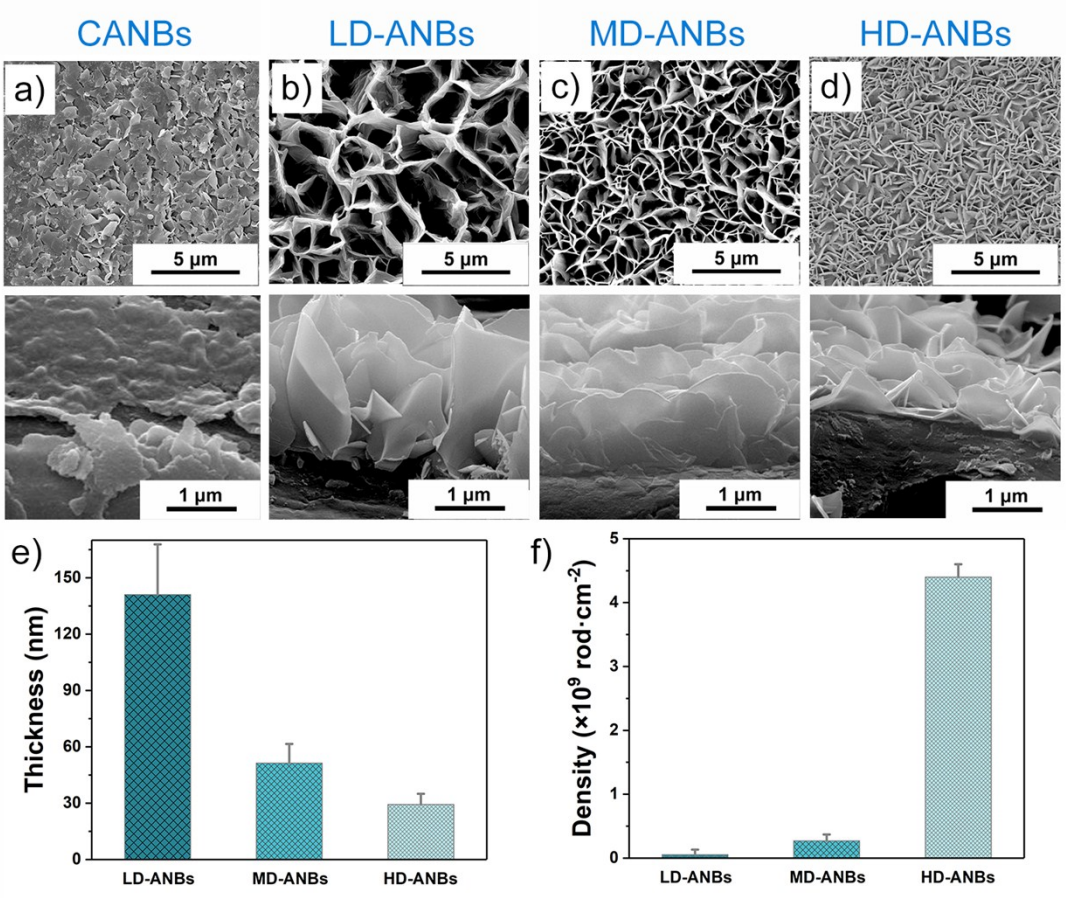


**Figure S4.** The topography change of ANBs prepared with different growth temperature. a) b-d) SEM images of ANBs hydrothermally grown on aluminum alloy sheet at 90, 70 and 50 °C, respectively, average topographic parameters: e) tip-width and f) density, as determined by SEM.

## E: Characteristics of the ANBs

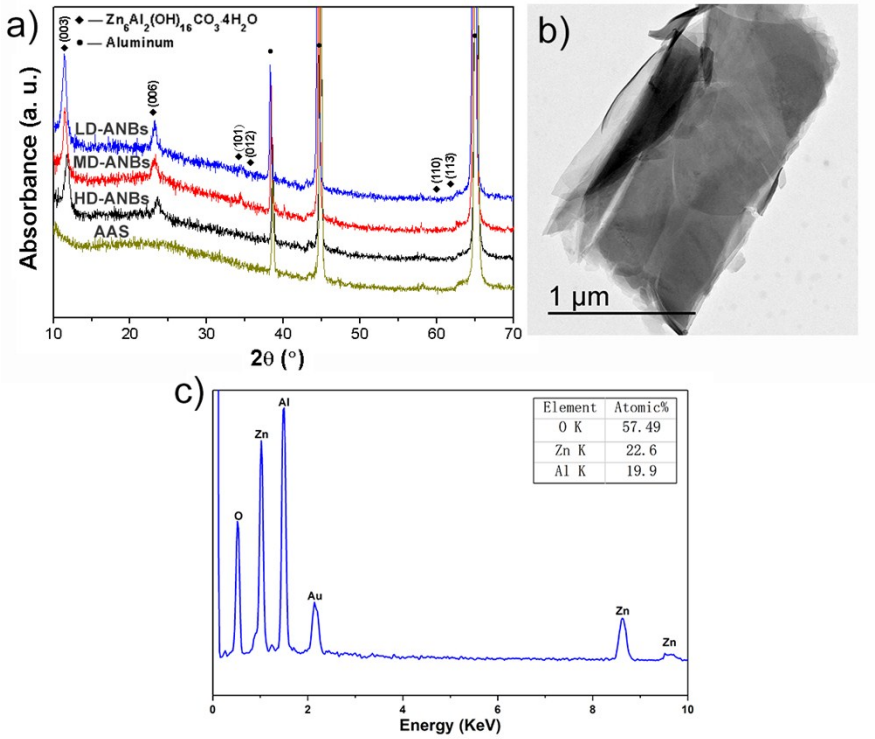


**Figure S5.** Characteristics of the aritificial nanoblades. a) XRD patterns of pristine AAS and ANBs on AAS. b) TEM image of a single Zn–Al layered double hydroxides nanoblade detached from ANBs. b) EDS spectrum of ANBs.

**F: Correlation between aritificial nanoblades morphology and bactericidal performance.**

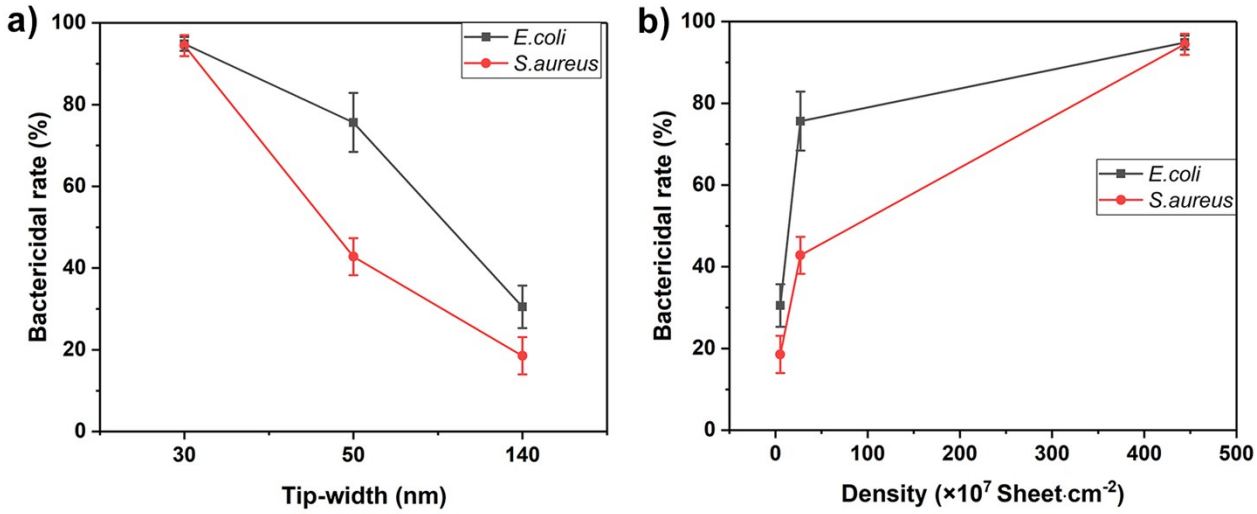


**Figure S6.** Correlation between aritificial nanoblades morphology and bactericidal performance.

a) Tip-width of nanoblade. b) Density of nanoblade.

**G: Difference in $\cdot O_2^-$ and $H_2O_2$ productivity of $H_2O$ and ANBs in dark**

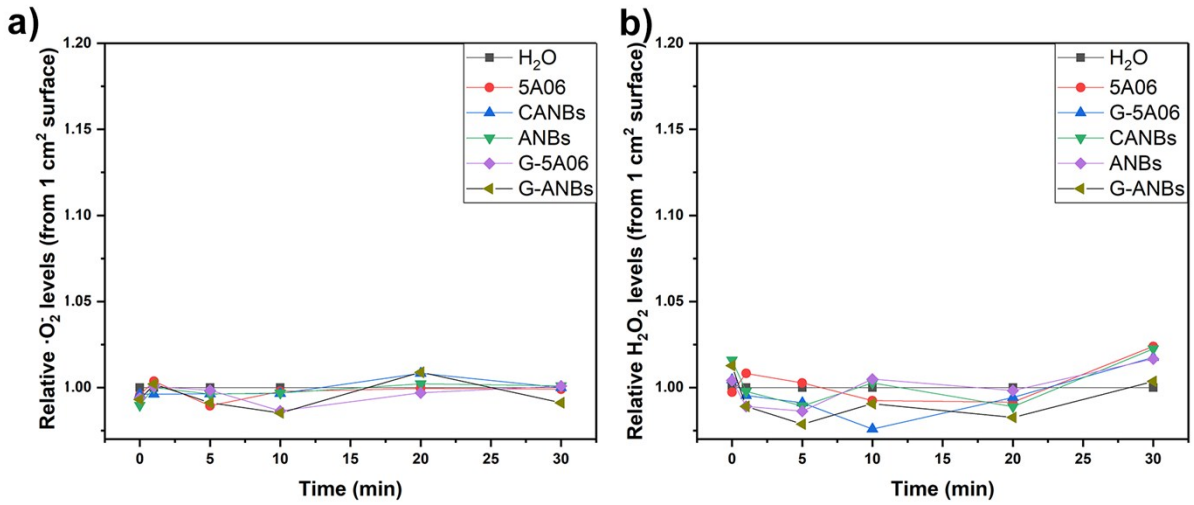


**Figure S7.** Production of $\cdot O_2^-$ and $H_2O_2$ of 5A06 aluminum alloy sheet and ANBs as the function of time.

**H: Difference in $Zn^{2+}$ and $Al^{3+}$ productivity of ANBs**

**TABLE S1.** Atomic Absorption Spectrometry Results of $Zn^{2+}$ and $Al^{3+}$ Leaching Out from ANBs

| Samples | Concentration of $Zn^{2+}$ (mg/L) | Concentration of $Al^{3+}$ (mg/L) |
|---|---|---|
| Compacted HD-ANBs | 0.623 ± 0.084 | 0.756 ± 0.179 |
| LD-ANBs | 0.212 ± 0.021 | 0.305 ± 0.067 |
| MD-ANBs | 0.227 ± 0.019 | 0.387 ± 0.073 |
| HD-ANBs | 0.192 ± 0.018 | 0.329 ± 0.078 |