

Electronic Supplementary Information

Oxygen Vacancy Induced Band Gap Narrowing of ZnO Nanostructure by Electrochemically Active Biofilm

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Pretreatment of electrochemically active biofilm for scanning electron microscopy (SEM)

In order to investigate the morphology of EAB, SEM was used after the pretreatment of EAB formed on carbon paper by following modified protocol [1,2]. Briefly, EAB formed on carbon paper was directly fixed by adding glutaraldehyde (2.5% final) and formaldehyde (2% final) and incubated at 4 °C overnight. Post-fixation was done for 90 min with Osmium solution (containing 1.5 mL of sodium phosphate buffer 0.2 M, 3 mL of 2% OsO₄ and 3 mL deionized water). Further, EAB was washed and dehydrated by successive 10 min incubations in 50% ethanol, 70% ethanol, 80% ethanol, 90% ethanol, and 95% ethanol followed by two successive 20 min incubations in 100% ethanol. After dehydrating, the EAB was incubated in isoamyl acetate for 20 min and dried with critical-point dryer (HCP-2, Hitachi, Japan). The pretreated EAB was affixed to SEM stubs and coated with white gold for 200 seconds using Ion-sputter (E-1030, Hitachi, Japan). Specimens were examined with the SEM S-4100 (Hitachi, Japan). The voltage was set at 15 kV and viewed at a magnification from x 2,000 to x15,000.

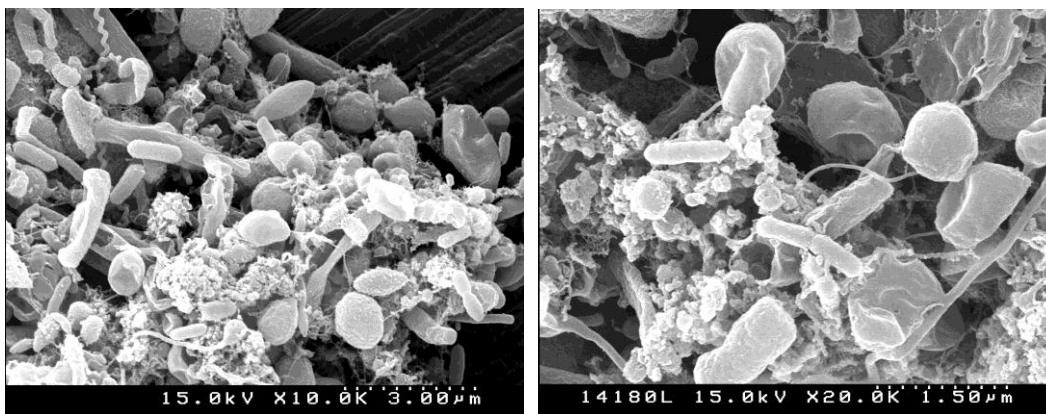


Fig. S1. Morphology of the Electrochemically Active Biofilm observed by SEM.

Schematic representation of modification process of ZnO by EAB

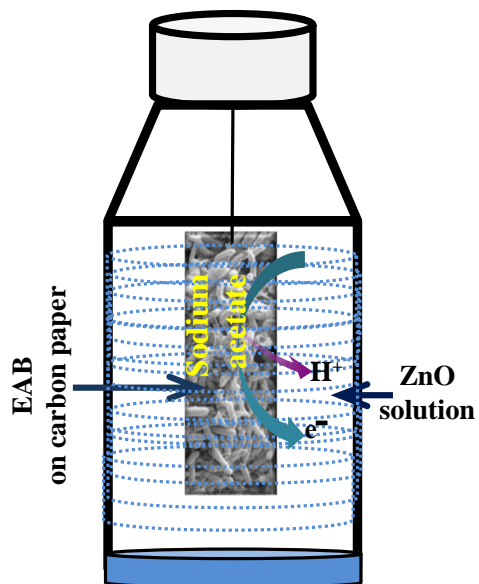


Fig. S2. Schematic representation of the Electrochemically Active Biofilm hung in a bottle for ZnO modification [3,4].

UV-vis diffuse absorption spectra of *p*-ZnO, with sodium acetate and with EAB only.

UV-vis diffuse absorption spectra of the controlled experiments performed to confirm the role of EAB and sodium acetate.

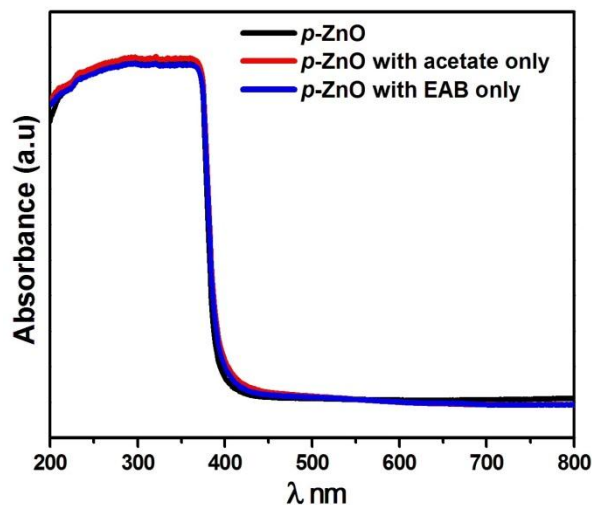


Fig. S3. UV-vis diffuse absorption spectra of *p*-ZnO, ZnO with sodium acetate and with EAB only.

References

- [1] M. M Hossain, H. Nakayama, , N. Goto, *Int. J. Dev. Neurosci.*, **1996**, 14, 11–17.
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- [4] M. M. Khan, S. Kalathil, J. Lee and M.H. Cho, *Bull. Korean Chem. Soc.*, 2012, **33**, 2592–2596.