

Supplemental Information

Harnessing Piperine for Enhanced Antimicrobial Activity of Carbon Dot-Modified Cellulose Fibers

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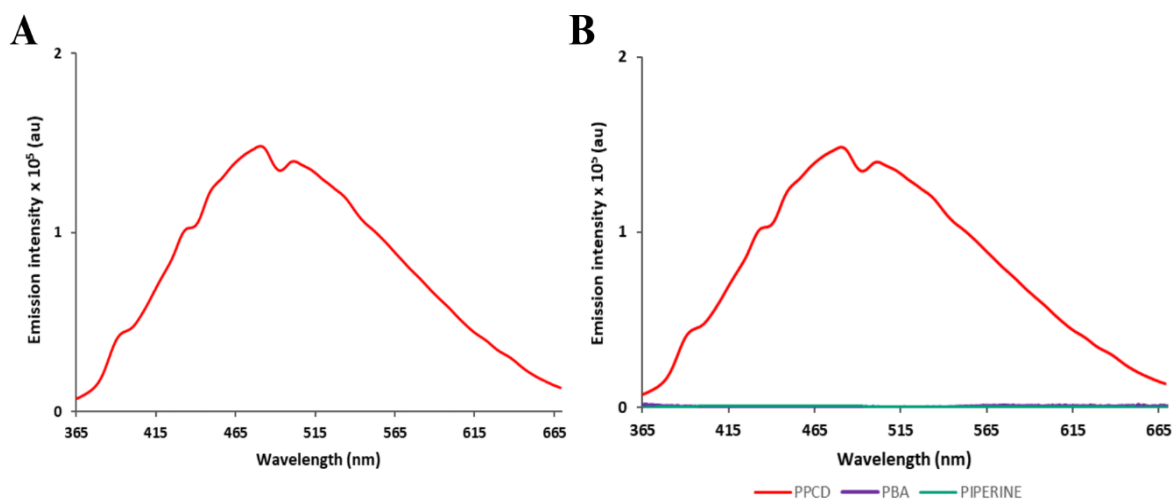


Fig. SI-1. Fluorescence analysis and emission spectra of PBA-PPCD and precursor materials. The emission spectra of A) PBA-PPCD B) Overlaid spectra of PBA-PPCD, PBA, and piperine.

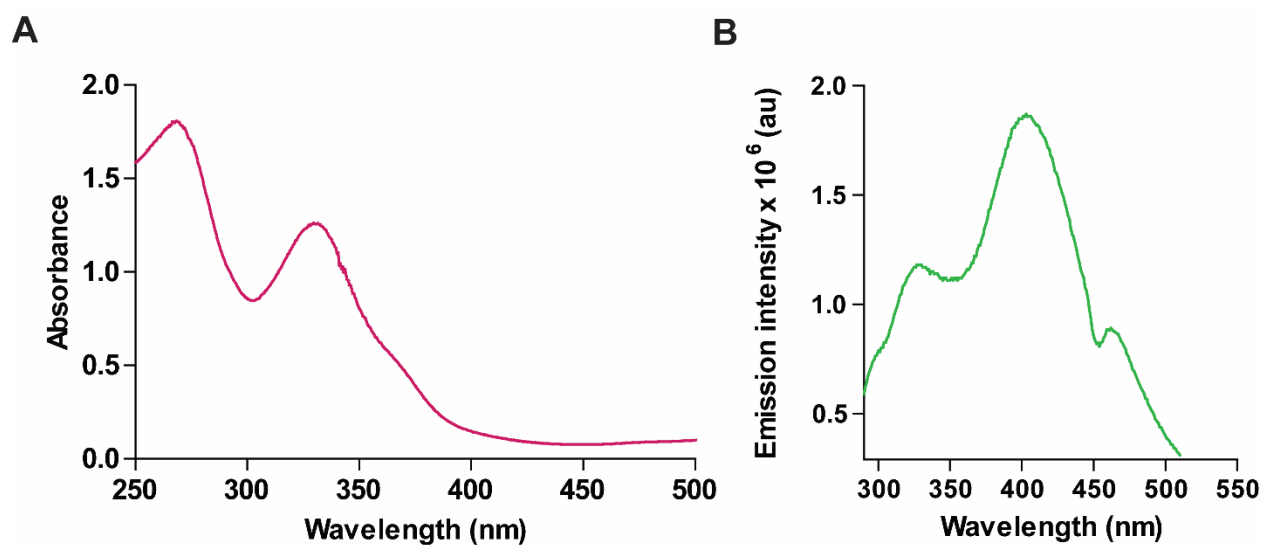


Fig. SI-2. UV-Vis and Emission Spectra of BACD

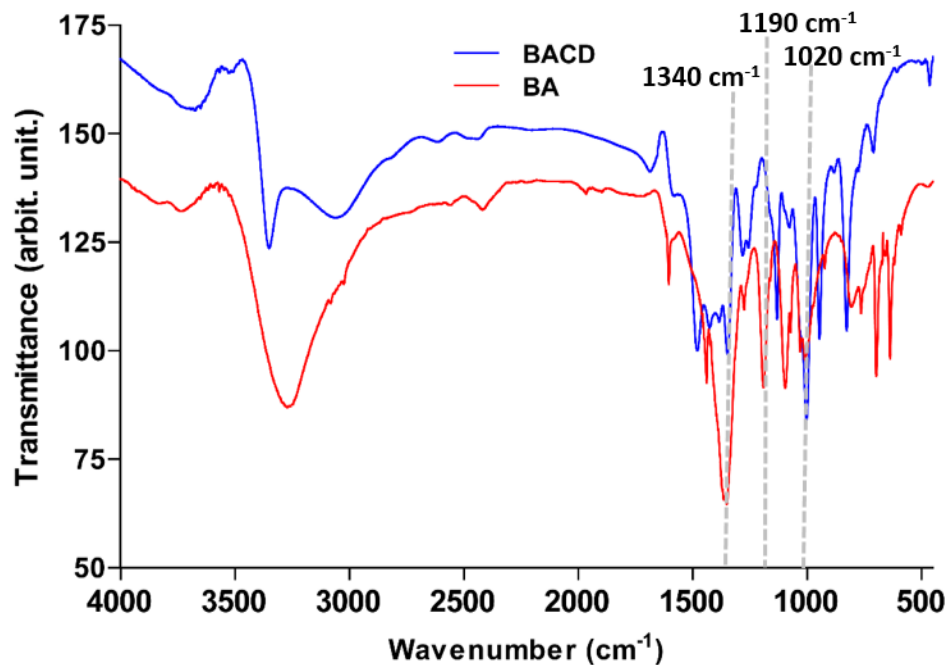


Fig. SI-3. FTIR Spectral analysis of BACD and precursor materials. Blue spectra correspond to BACD whereas red spectra correspond to its precursor material phenyl boronic acid.

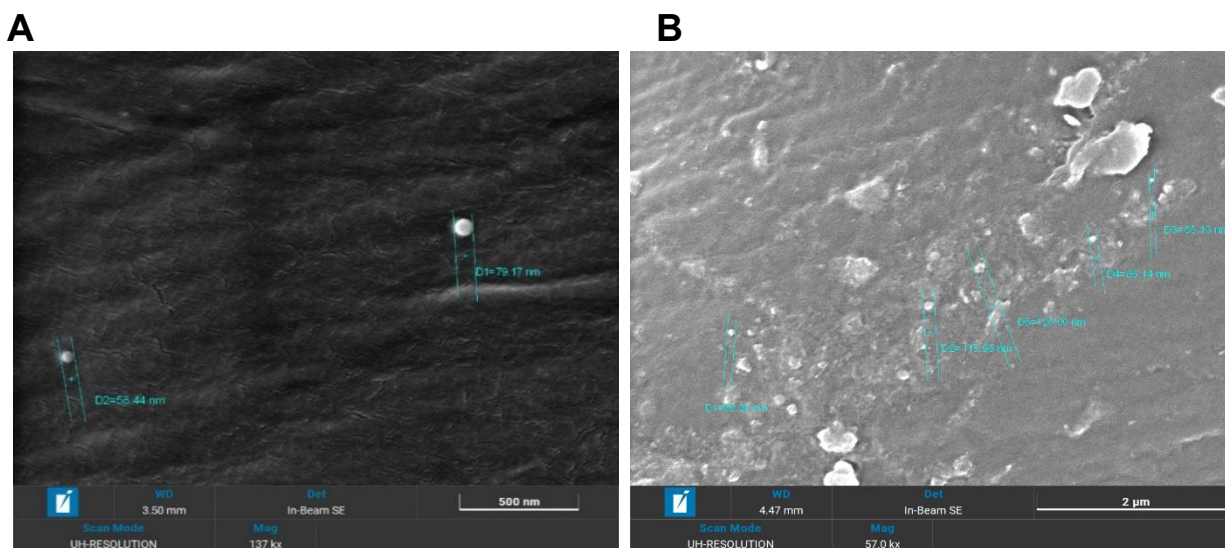


Fig. SI-4: The SEM images of PBA-PPCD The Ultra high resolution SEM images of A) PBA-PPCD modified paper discs and B) PBA-PPCD modified cotton fibers. For both modifications the original solution of PBA-PPCD was used.

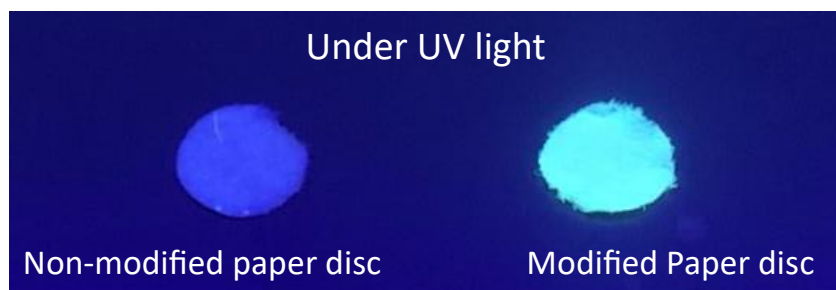


Fig. SI-5: Modified & non-modified paper discs under UV light. A significant change in the fluorescence intensity was observed between PBA-PPCD modified and non-modified paper discs.

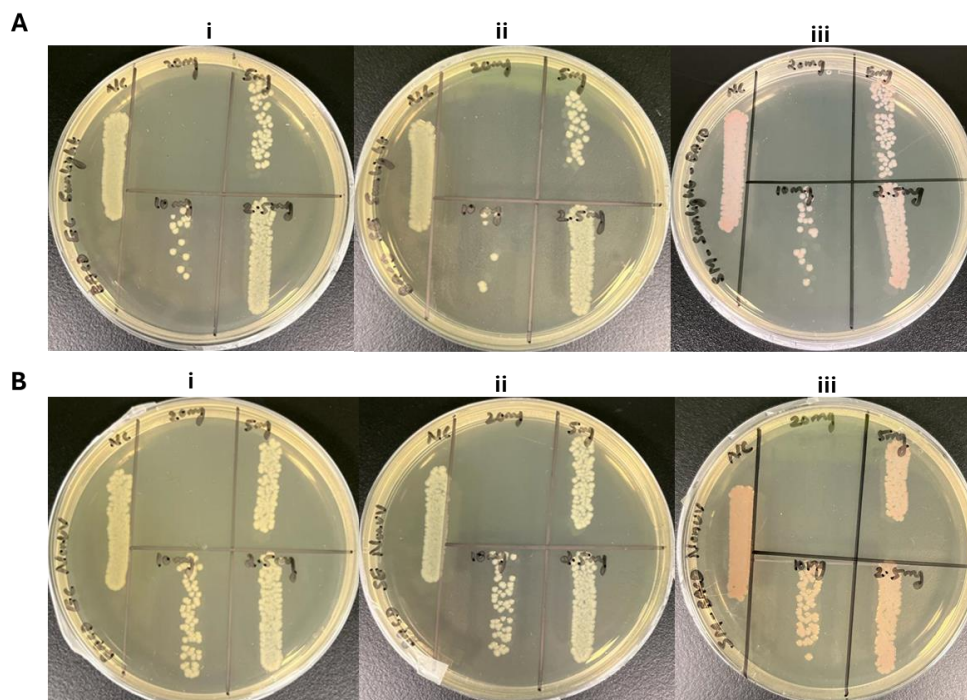


Fig. SI-6: Bactericidal activity of BACD on i) *Escherichia coli* ii) *Staphylococcus epidermidis* iii) *Serratia marcescens* A) Bacterial growth after treatment in the presence of stimulated sunlight B) Bacterial growth after treatment in the absence of sunlight (dark).

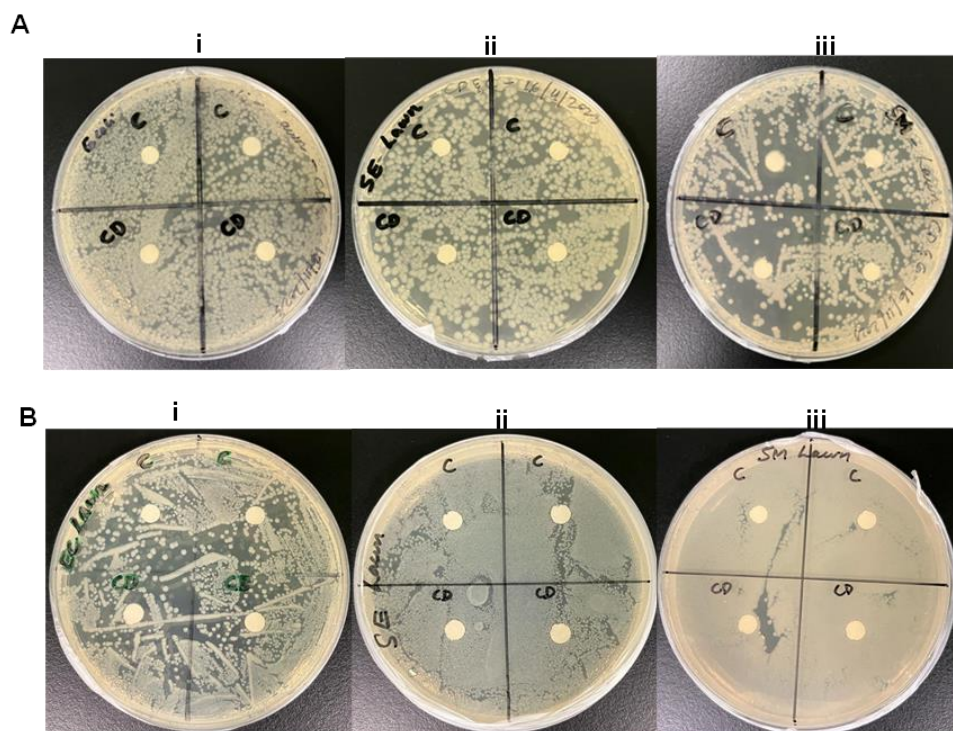


Fig. SI-7: CD treated paper discs on bacterial lawn A) PBA-PPCD and B) BACD i) *Escherichia coli* ii) *Staphylococcus epidermidis* iii) *Serratia marcescens*. Each plate contains duplicates of unmodified paper disc (C) and PBA-PPCD modified paper discs (CD).

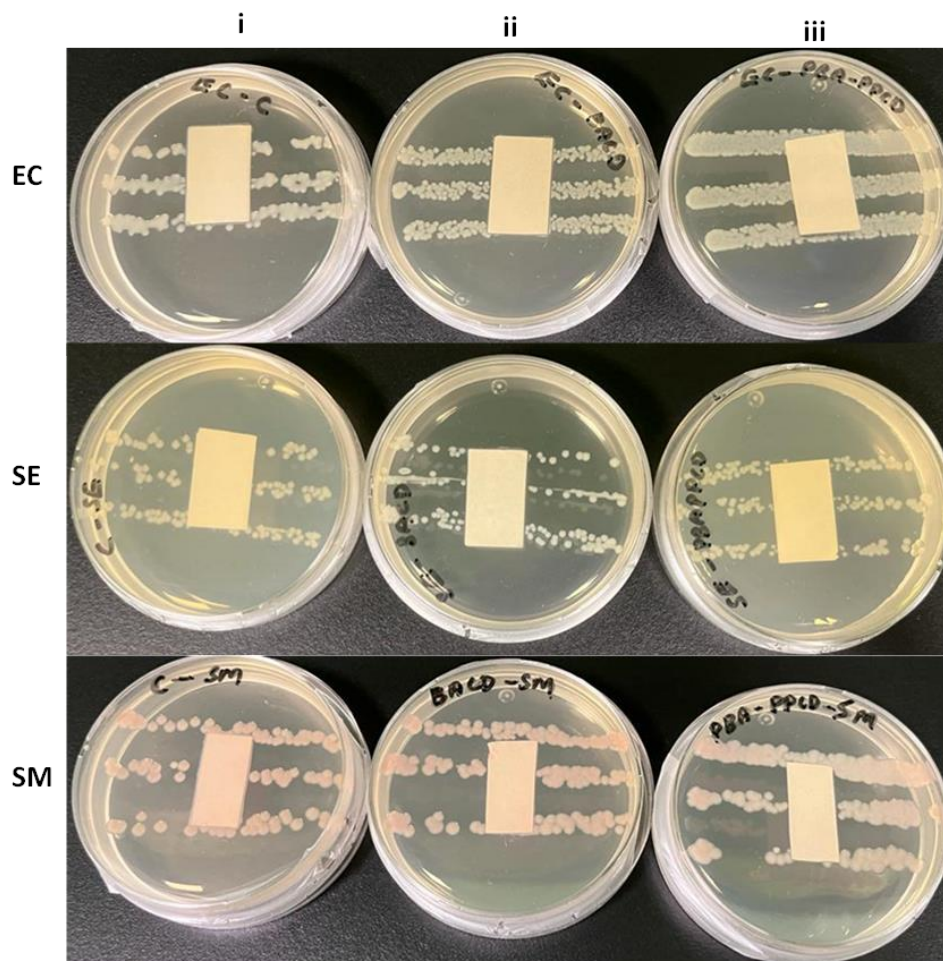


Fig. SI-8: AATCC 147 Parallel streaking Diffusivity Test on *Escherichia coli* (EC), *Staphylococcus epidermidis* (SE), *Serratia marcescens* (SM) which show the non-diffusivity of CDs from treated paper. i) Control disc ii) BACD treated paper discs and iii) PBA-PPCD treated discs.

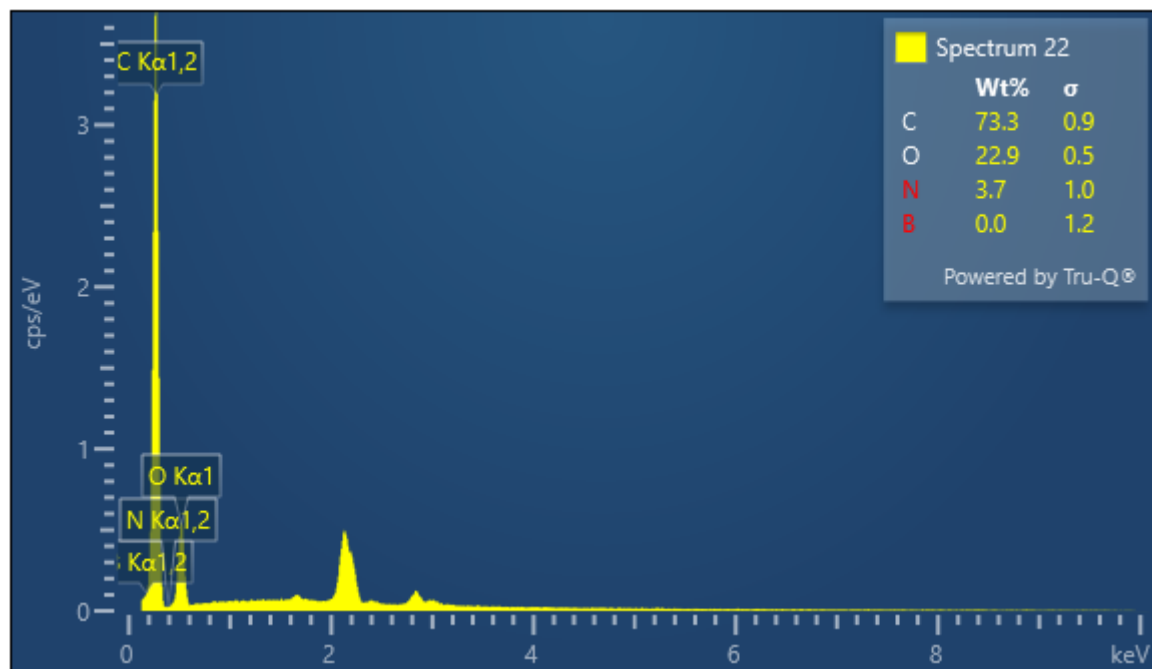


Fig. SI-9: The energy-dispersive X-ray spectroscopy (EDS) results for the CD-modified fibers