Electronic Supplementary Material (ESI) for Materials Advances.

Electronic Supplementary Information

A novel receptor-free polydiacetylene nanofiber biosensor for detecting *E. coli* via colorimetric changes

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1. Electrospinning of PU-PDA nanofibers

2 g PU and 1 g PCDA were mixed in 8.34 ml THF and stirred overnight at 1200 rpm and 55º C. Then, the mixture was added to 8.34 ml DMF and was stirred overnight until a fine pink homogeneous solution of PU-PCDA was yielded. A customized electrospinning apparatus was used to produce PU-PDA nanofiber mats. The apparatus is primarily consisted of a Gamma High Voltage Research ES50P power supply and a Harvard PHD 2000 syringe pump. For electrospinning, a PU-PCDA solution loaded in a syringe was injected by the syringe pump at a constant speed of 0.12 ml/h and a 12-kV electrical force was generated by the power supply. The spinning time was 1 h for each mat and nanofibers were collected on an aluminum collector plate placed at a collection distance of 21 cm. A non-woven mat consisting of colorless PU-PCDA nanofibers was obtained, showing white in color. The PU-PCDA nanofiber mat was then exposed to a UV light (Spectroline, Westbury, NY) at 254 nm for 3 min. The PCDAs in the nanofibers were photo-polymerized by the UV irradiation, resulting in PDAs mixed with PU in the nanofibers. The color of the PU-PDA nanofiber mats became blue after the photo-polymerization.

2. Culture media preparation

LB culture medium was prepared by combining 5 g of tryptone, 2.5 g of NaCl, and 2.5 g of yeast extract in 500 ml of distilled water and sterilized by autoclaving at 250° F at 23 psi pressure for 20 min. For preparing M9 minimal media, 56.4 g M9 minimal salt was dissolved in 1 L distilled water and sterilized at 250° F at 23 psi pressure for 20 min. Then, 200 ml of minimal salt solution was diluted by adding 800 ml of sterilized water to prepare a 1 L solution. After that, 10 ml filter-sterilized 20% arabinose solution, 2 ml filter-sterilized 1.0 M $MgSO_4$, 10 ml filter-sterilized 1 mg/ml thiamine solution and 0.1 ml filter-sterilized 1.0 M $CaCl_2$ solution were added to the diluted minimal salt solution, resulting in M9 minimal media. All the filter-sterilization was conducted by

using 0.2 µm syringe polyethersulfone (PES) filters. Both LB media and M9 minimal media were used to grow *E. coli* for testing colorimetric properties of PU-PDA nanofibers.

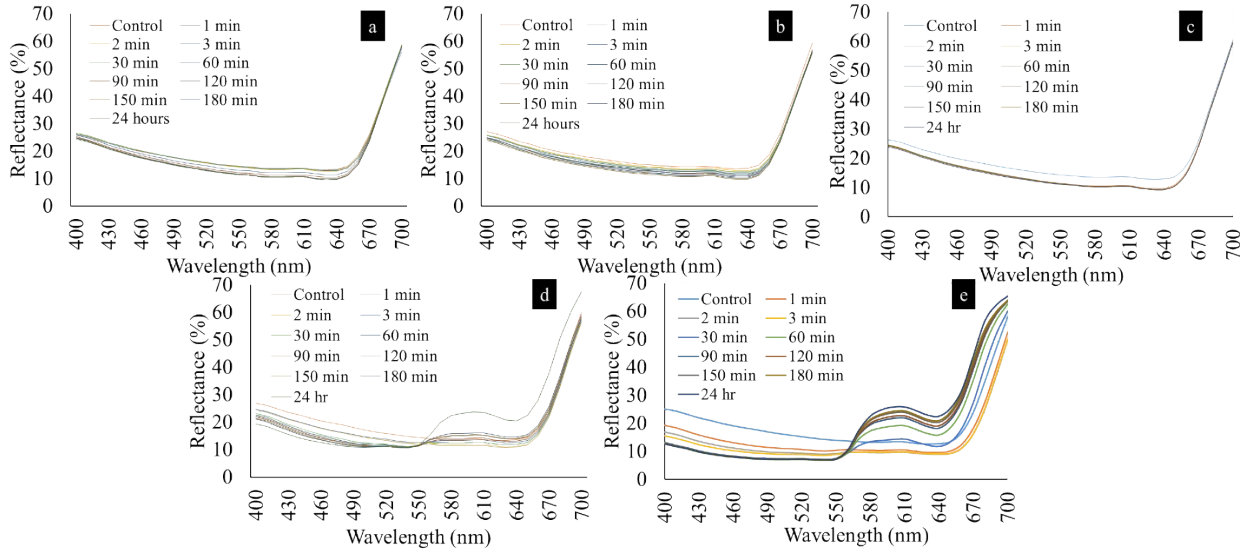

Figure S1. Representative reflectance spectra of PU-PDA nanofibers treated with (a) non-autoclaved cell pellet, (b) autoclaved cell pellet, (c) LB media, (d) non-autoclaved supernatant fluid, (e) autoclaved supernatant fluid.