Electrochemical impedance analysis of CYFRA 21-1 antigen based on doxorubicin-initiated ROP signal amplification

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Materials and reagents

N-Hydroxysuccinimide (NHS), tetrahydrofuran (THF), succinic anhydride, anhydrous 1,4-dioxane, 4-dimethylaminopyridine (DMAP), tetrabutylammonium fluoride (TBAF), 1-ethyl-3-(3-dimethyllaminopropyl) carbodiimide hydrochloride (EDC), Dicyclohexylcarbodiimide (DCC), 2-Ethylhexanoate ($Sn(Oct)_2$), ε-caprolactone (ε-CL) and polyethylene oxide (PEO) were bought from Shanghai Aladdin Reagent Co., Ltd. (Shanghai, China). Doxorubicin, triethylamine and toluene were purchased from Shanghai Macklin Biochemical Technology Co., Ltd. (Shanghai, China). Bovine serum albumin (BSA) was obtained from Beijing Solarbio Science & Technology Co., Ltd. (Beijing, China). 4-(2-trimethylsilylethynyl) benzoic acid (TEB) was acquired from J&K Scientific Ltd. (Beijing, China) All chemicals are analytical reagents. The samples of normal human serum were obtained from Yu Duo Co., Ltd. (Shanghai, China). Patients with lung cancer clinical serum samples were obtained from the third affiliated hospital of Henan University of Chinese Medicine. The CYFRA 21-1 antigen and the corresponding antibody were provided by Key-Bio Biotech Co., Ltd. (Beijing, China).

Apparatus

All electrochemical impedance spectroscopy (EIS) and cyclic voltammetry (CV) tests were performed with a three-electrode system, which connected to an Autolab/PGSTAT204 electrochemical workstation (Eco Chemie, Netherlands). The three-electrode system includes a saturated calomel electrode, a platinum wire electrode and a gold electrode, which are used as the reference electrode, counter electrode and working electrode respectively.

The static water contact angle (WCA) was recorded on a droplet shape analyzer-DSA100 (KRÜSS, Germany). Scanning electron microscopy (SEM) was performed on a Sigma HD field emission SEM (Zeiss, Germany). X-ray diffraction (XRD) spectrum was obtained by a Shimadzu XRD–6000 X-ray diffractometer with a Cu Kα radiation source. The nuclear magnetic resonance (NMR) spectrum was measured on a Bruker DRX–500 NMR spectrometer using $CDCl_3$ as solvent. Fourier transform infrared spectroscopy (FTIR) spectrum was acquired by using an FTIR–Nicolet IS5 spectrophotometer (Thermo, USA).

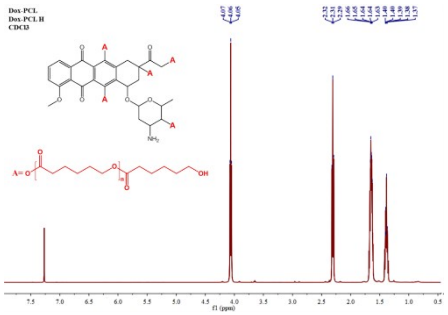

Figure S1 ^{1}H NMR of Dox-PCL

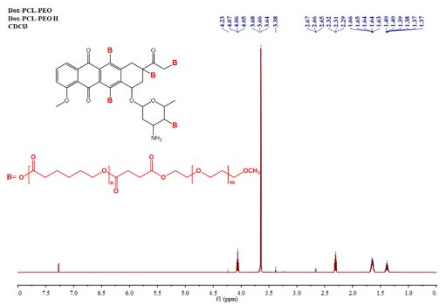

Figure S2 ^{1}H NMR of Dox-PCL-PEO

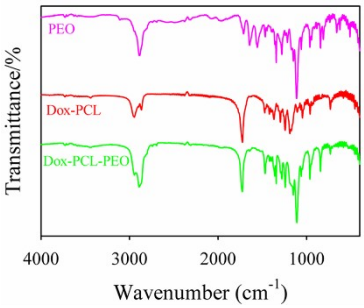

Figure S3 FTIR of PEO, Dox-PCL, and Dox-PCL-PEO

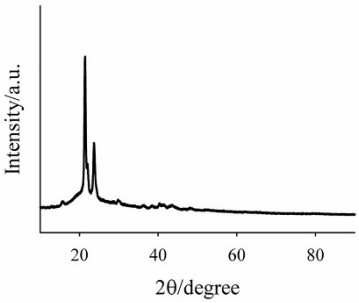

Figure S4 XRD of Dox-PCL

On behalf of my co-authors, we would like to submit the enclosed manuscript entitled "***Electrochemical impedance analysis of CYFRA 21-1 antigen based on doxorubicin-induced ROP signal amplification***," which we wish to be considered for publication in **New Journal of Chemistry**.