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Supplementary Material

Programmed co-delivery of platinum nanodrugs and Gemcitabine by clustered nanocarrier for precision chemotherapy

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Contents:

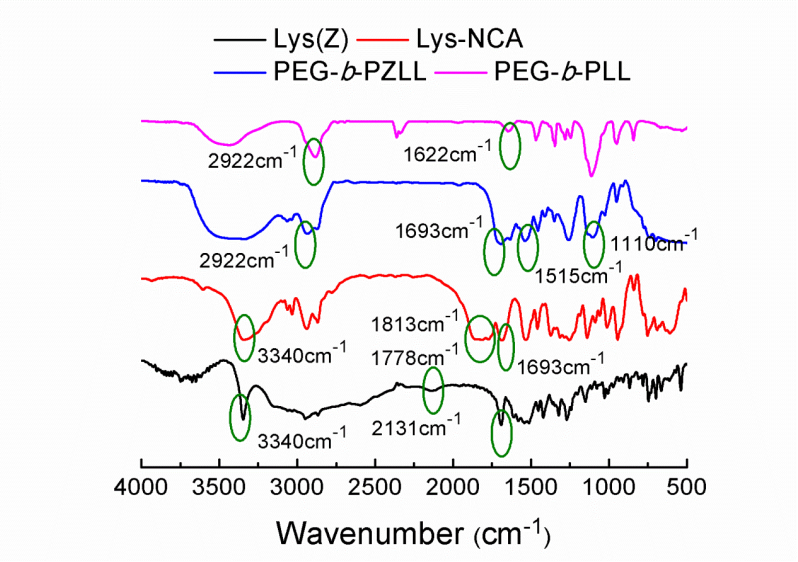

Figure S1. FT-IR spectrum of PEG-*b*-PZLL and PEG-*b*-PLL. In the Lys-NCA spectrum, the two peaks at 1778 cm^{-1} and 1813 cm^{-1} correspond to the carbonyl in NCA, while the hydroxyl (-OH) peak at 2130 cm^{-1} has disappeared compared with the Lys(Z) spectrum, suggesting that Lys-NCA has successfully formed. In the PEG-*b*-PZLL spectrum, the peak at 1110 cm^{-1} is assigned to the C-O of PEG, and the peak at 2922 cm^{-1} corresponds to the C-H of PEG, while the carbonyl peaks at 1778 cm^{-1} and 1813 cm^{-1} have disappeared compared with the Lys-NCA spectrum, indicating that PEG-NH_2 successfully initiated the ring-opening polymerization with NCA. In the PEG-*b*-PLL spectrum, the benzyloxycarbonyl peak at 1693 cm^{-1} has disappeared and an N-H peak at 3489 cm^{-1} has appeared compared with the PEG-*b*-PZLL spectrum, indicating that debenzylation has occurred.

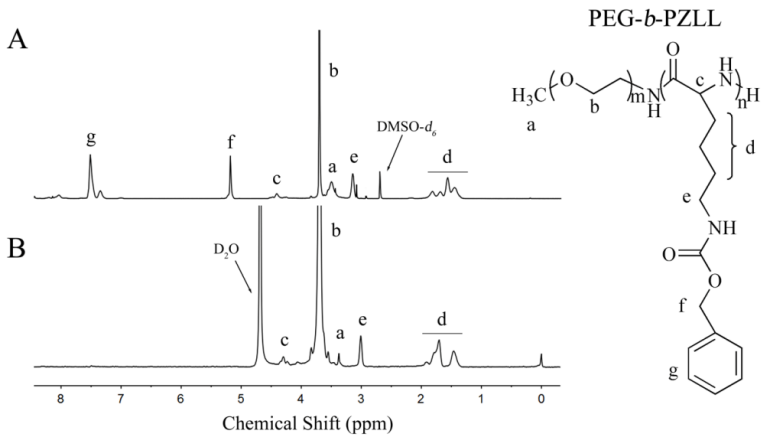

Figure S2. ^{1}H NMR spectrum of (A) PEG-*b*-PZLL and (B) PEG-*b*-PLL, which is briefly analyzed as: Both the characteristic proton resonance peak of repeat units in the -CH_2CH_2- block of the PEG at δ3.94 (b), and the characteristic peaks at δ7.3~δ7.4 (g)、δ5.4 (f)、δ4.6 (c)、δ1.4~δ2.0 (d) of Lys(Z) indicate that PEG-NH_2 triggered the ring-opening reaction and polymerization of Lys-NCA successfully. Comparing the PEG-*b*-PZLL and PEG-*b*-PLL ^{1}H NMR spectra, the typical carbobenzoxy group peaks at δ5.4 and δ7.3~δ7.4 ppm have disappeared, indicating that the PEG-*b*-PZLL deprotection process is complete. Comparing the signal intensities of the PLL methylene protons (–CH_2–CH_2–CH_2–) with those of the methylene protons of PEG(–CH_2–CH_2–O–), we calculated the value of the polymerization degree of PLL as 10.

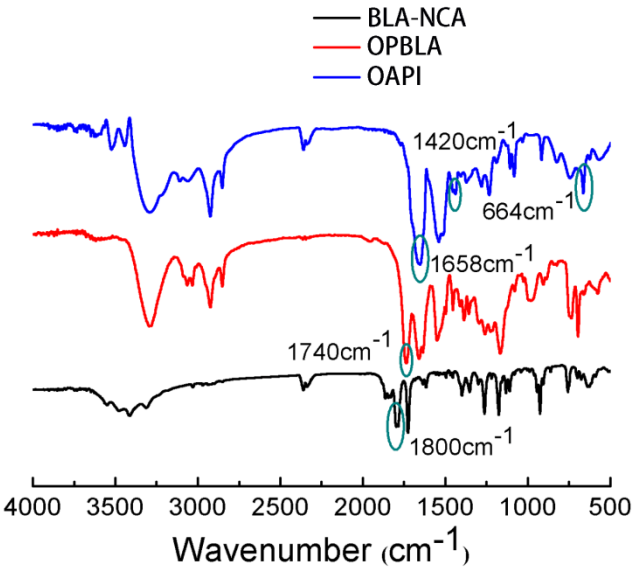

Figure S3. FT-IR spectrum of OAPI and OPBLA. In the BLA-NCA spectrum, the two peaks at 1800 cm^{-1} and 1730 cm^{-1} correspond to two carbonyl peaks in NCA. In the OPBLA spectrum, the corresponding NCA peaks have disappeared, and the characteristic absorption peaks of ester bonds have appeared at 1740 cm^{-1}, indicating that the ring-opening reaction was successfully initiated. In the OAPI spectrum, the peak corresponding to ester bonds has disappeared, while the CH_2 characteristic peak has appeared at 1420 cm^{-1}, indicating that the amido bond was formed.

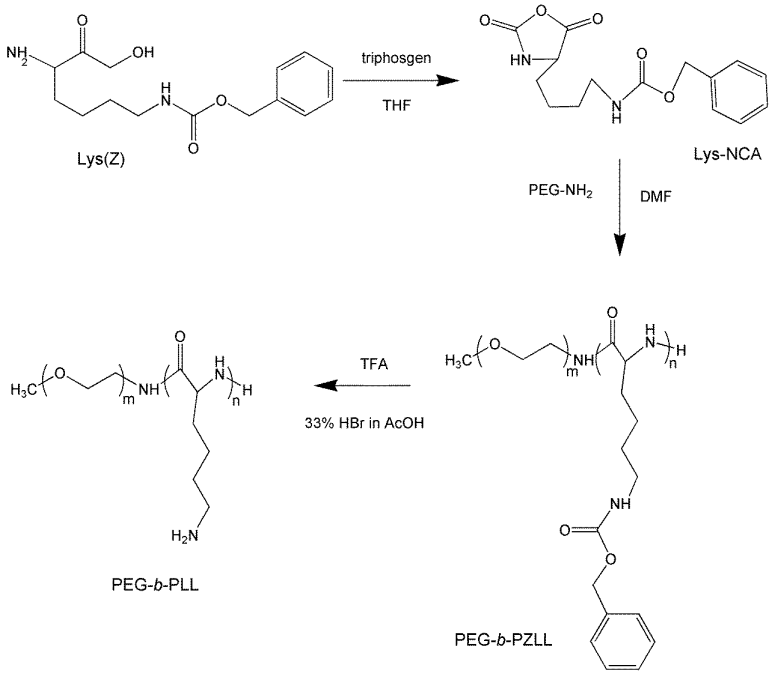

Figure S4. General synthetic route of the PEG-*b*-PLL block copolymer. PEG-*b*-PLL was synthesized using PEG-NH_2 as an initiator to trigger the ring-opening polymerization of Lys-NCA, followed by the deprotection of the benzyloxycarbonyl groups.

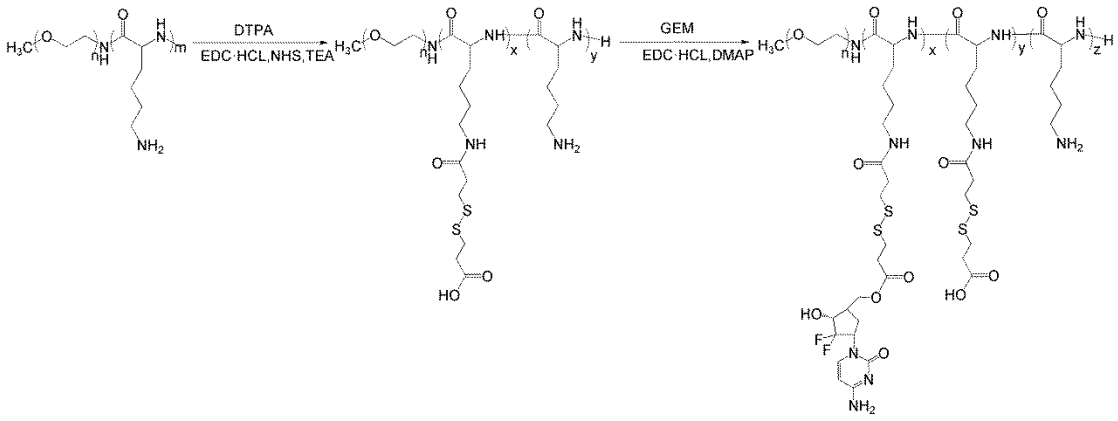

Figure S5. General synthetic route of the PEG-*b*-P(LL-*g*-GEM) block copolymer. 3,3'-Dithiodipropionic acid (DTPA) was conjugated to the amino groups of the PEG-*b*-PLL, followed with coupled Gemcitabine to obtain PEG-*b*-P(LL-*g*-GEM) block copolymer.

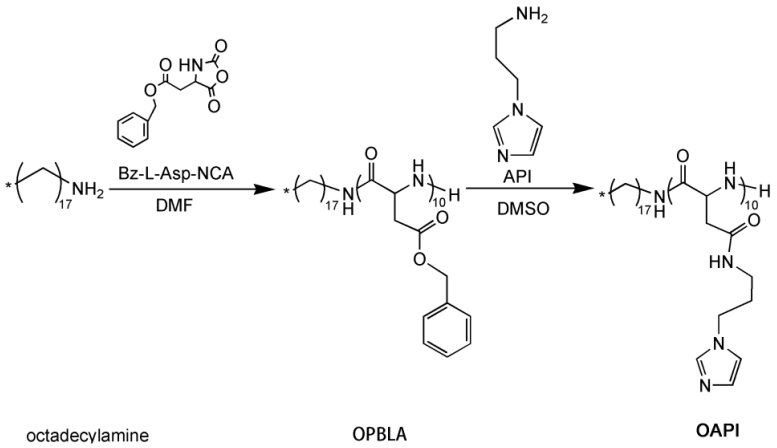

Figure S6. The general synthetic route of OAPI. The OPBLA polymers were synthesized by ring opening polymerization and then OAPI was obtained via aminolysis of the OPBLA with 1-(3-aminopropyl)imidazole (API).

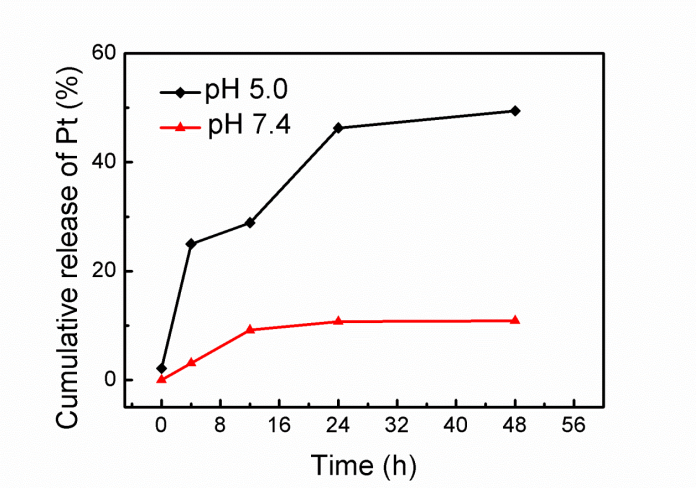

Figure S7. *In vitro* cumulative Pt release from USPtNs. The release behavior of Pt ions from USPtNs under different pH conditions (pH = 5.0, 7.4) was investigated by a dialysis method. A large amount of Pt^{2+} was found to be released from the USPtNs at pH 5.0, while the USPtNs remained relatively stable in neutral condition**.** The Pt concentrations were measured by ICP-MS (Perkin Elmer, Waltham, MA, USA).