Electronic Supplementary Material (ESI) for Journal of Materials Chemistry

Supporting Information

Zippered Release from Polymer-Gated Carbon Nanotubes

Afnan Mashat,[a‡] *Lin Deng,*[a‡] *Azza Altawashi,*[b] *Rachid Sougrat,*[c] *Guangchao Wang,*[c] *and Niveen M. Khashab*[a*]

[a] Controlled Release and Delivery Lab (CRD), Advanced Membranes and Porous Materials Center, King Abdullah University of Science and Technology (KAUST), Thuwal 23955-6900, Kingdom of Saudi Arabia. Fax: +966-2-802-1172; Tel: +966-2-808-2410; E-mail: niveen.khashab@kaust.edu.sa

[b] Chemical and Life Sciences and Engineering Division, King Abdullah University of Science and Technology (KAUST), Thuwal 23955-6900, Kingdom of Saudi Arabia

[c] Advanced Nanofabrication, Imaging and Characterization Core Facilities, King Abdullah University of Science and Technology (KAUST), Thuwal 23955-6900, Kingdom of Saudi Arabia.

‡ Both authors contributed equally to this work.

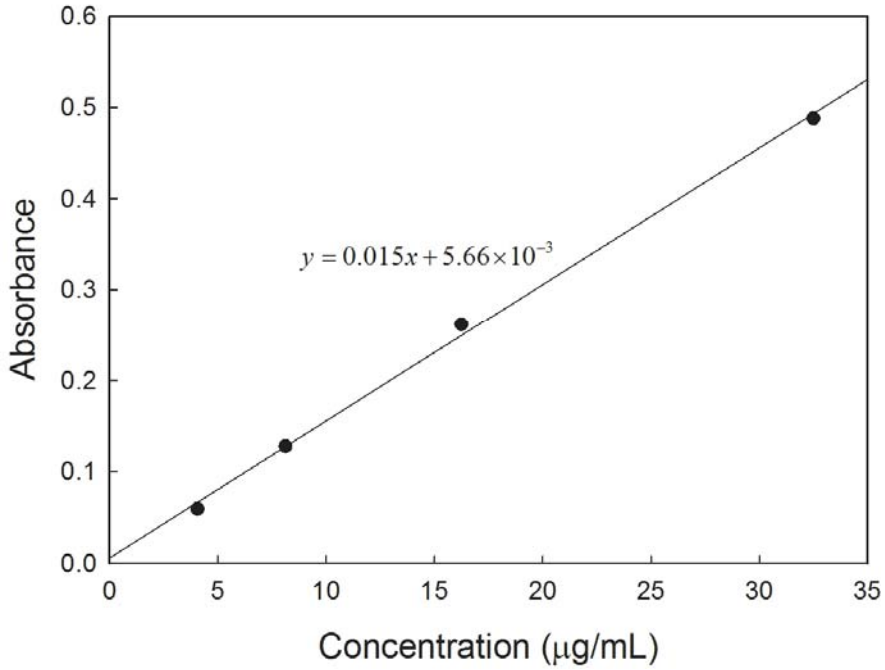


Figure S1. The relation between the intensity and the concentration of DOX in DMSO solutions measured by UV-Vis spectrometry.

The concentration of DOX on CNT-PEI/PVA was calculated. Based on the UV-Vis spectra, 34.128 μg of DOX can be loaded on 1 mg of CNT-PEI/PVA. A series of DOX in DMSO solutions with known concentrations were used to get the calibration curve as it can be seen in figure S1.

DMSO was added to 1 mg of CNTs-PEI/PVA. The absorbance of DOX was tested after all the DOX was released by the influence of DMSO dissolving the polymers. After the absorption of DOX on 1 mg CNTs-PEI/PVA was measured, the DOX concentration was calculated by the compensation on the equation:

$Y = 0.015X + 5.66 \times 10^{-3}$.

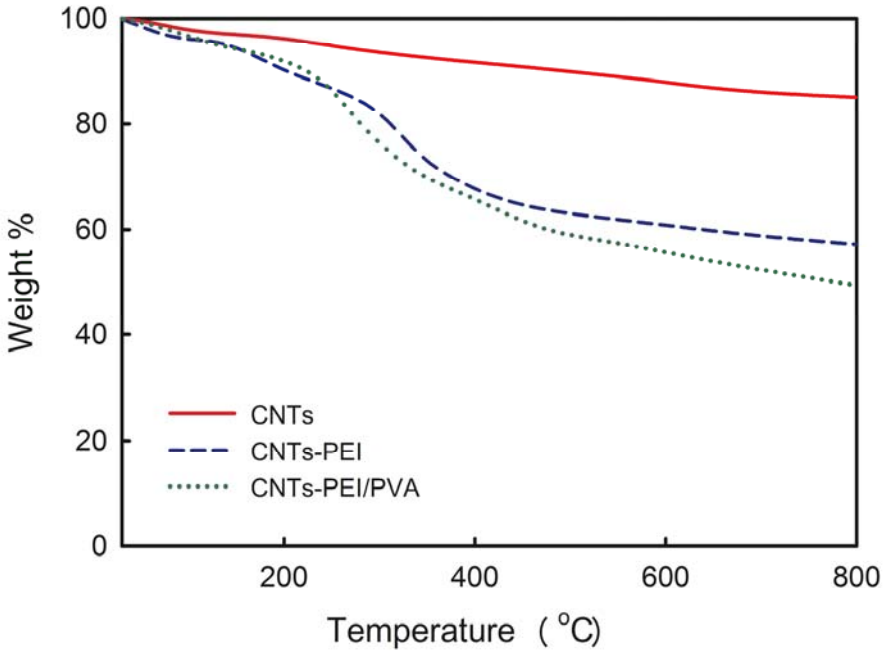


Figure S2. Thermogravimetric analysis (TGA) curves of (red) CNTs-COOH, (blue) CNT-PEI and (green) CNTs-PEI/PVA.

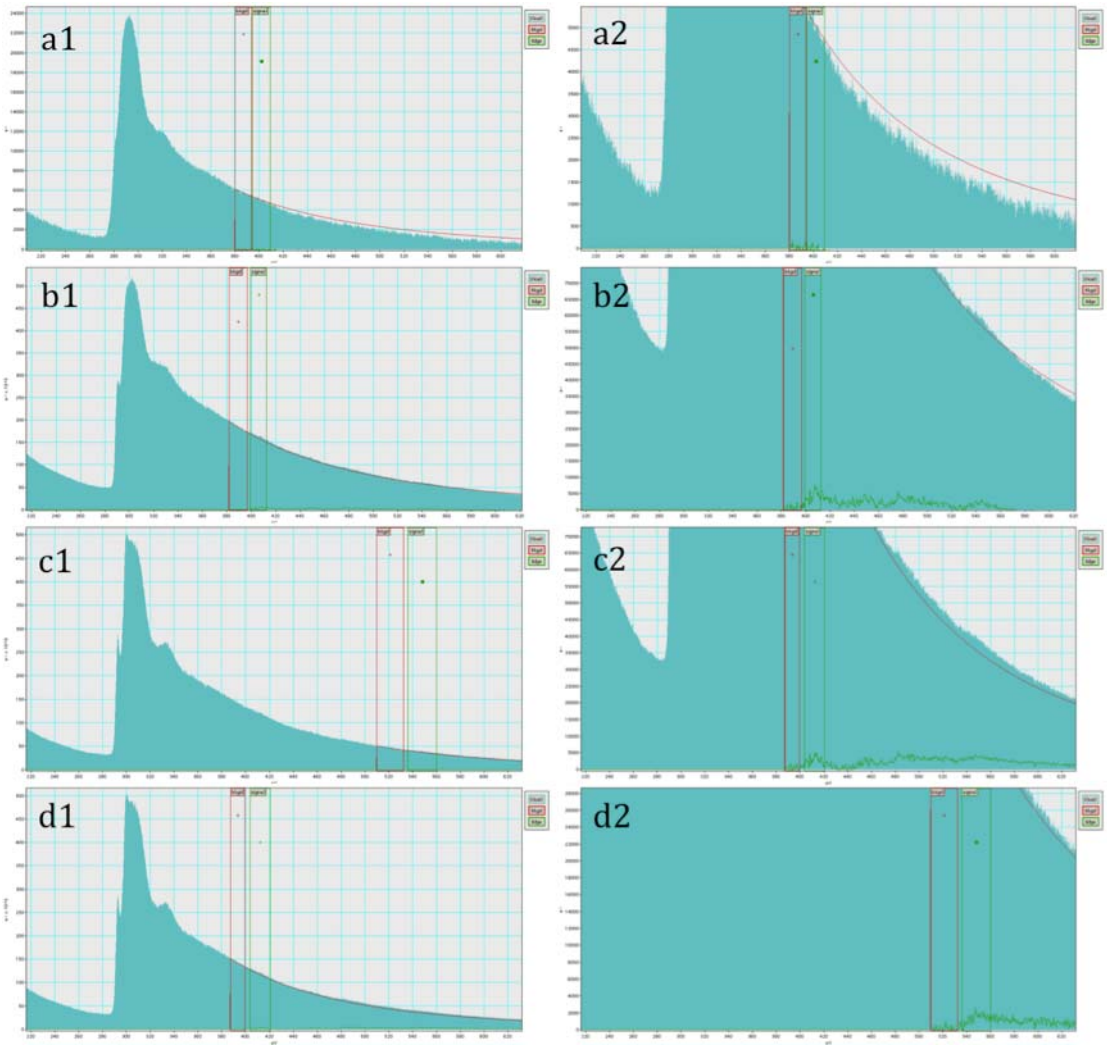
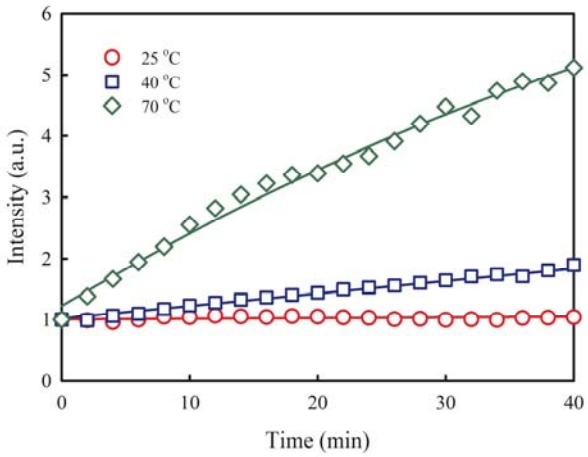


Figure S3. Electron energy loss spectroscopy (EELS) results of (a1, 2) CNTs-COOH, (b1, 2) CNTs-PEI, (c1, 2 and d1, 2) CNTs-PEI/PVA. 2 is amplified figure of 1, including EELS peaks after deduction of background. The green peaks in b2 and c2 are ascribed to the signals of N, and the green peak in d2 is ascribed to the signals of O.

(a)



(b)

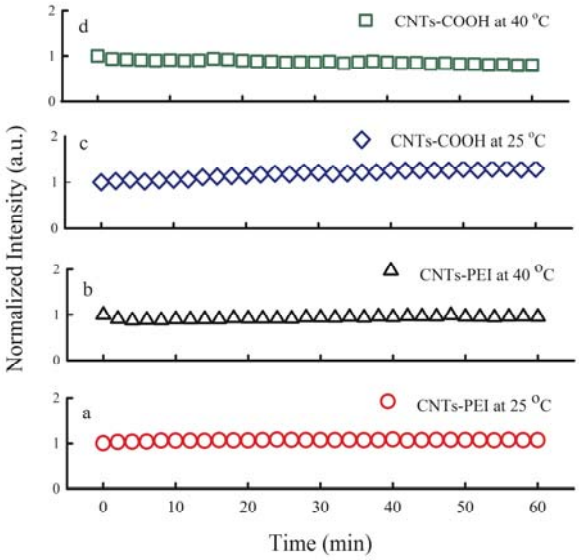


Figure S4. (a) Rhodamine B (RhB) release from CNTs-PEI/PVA at different temperatures. (b) No release from control samples (CNTs-COOH, CNTs-PEI at 25 °C and 40 °C).

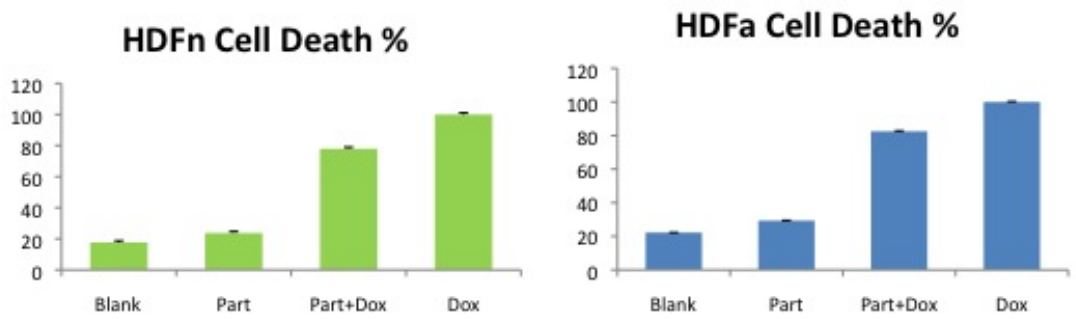


Figure S5. Cell viabilities of primary cells Human Dermal Fibroblast adult (HDFa) and Human Dermal Fibroblast neonatal (HDFn). Blank= (no treatment), Part = (CNTs-PEI/PVA), Part+DOX= (DOX loaded into CNTs-PEI/PVA), and DOX= (cell treated only with DOX).

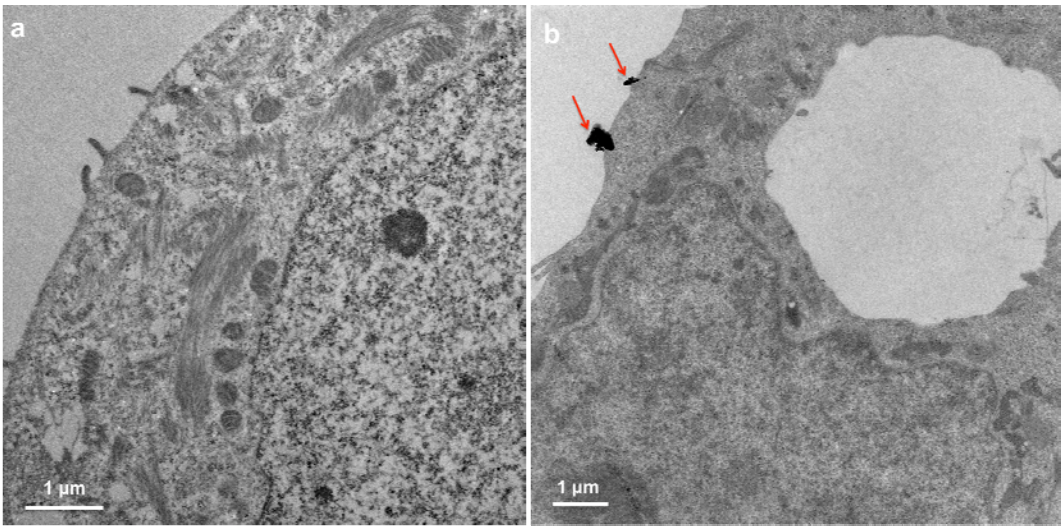


Figure S6. (a) TEM images of untreated BA cells, (b) DOX loaded CNTs-PEI/PVA treated BA cells. The red arrows point to CNTs-PEI/PVA that appears adhering to the cell membrane.