Supplementary information for

Tetracycline Hydrochloride loaded Regenerated Cellulose Composite Membranes with Controlled Release and Efficient Antibacterial Performance

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Experimental

Mechanical property

The mechanical properties of RC and its composite membranes were tested according to the GB/T 1040.3-2006 standard. The stress-strain behaviors were measured by a dynamic mechanical analyzer (CMT4204, Shenzhen SANS Testing Machine Co., Ltd., China). Samples were cut manually by a razor blade into strips 30 mm×5 mm×～40 μm). The static tensile tests were conducted in a ramp displacement mode at a cross-head speed of 2 mm/min. Each sample was measured for at least five times. The average value was calculated and the error bars were calculated.

Porosity calculation

The samples were infiltrated with 99% ethanol in a 25-mL beaker under -0.08MPa for 5 min in a vacuum oven. Subsequently, the tested sample was weighed in a 10-mL test tube and recorded as W_1 and weighed again after ethanol was filled in the tube and recorded as W_2. V_0 was calculated from Eq. (1):

$$V_0 = 10 - [(W_2 - W_1) / \rho_{ethanol}] \quad (1)$$

where $\rho_{ethanol}$ is the density of ethanol and is 0.79 g/cm^3 at room temperature.

The density of the composite membrane (ρ_S) was calculated with Eq. (2):

$$\rho_s = 1 / [(1 - \mu_{TCH}) / \rho_{RC} + \mu_{TCH} / \rho_{TCH}] \quad (2)$$

where μ_{TCH} is the TCH weight fraction in the RC-TCH composite membrane; ρ_{TCH} refer to the densities of TCH and were 1.644 g/cm^3. The porosity of the composites was calculated from Eq. (3):

$$\text{Porosity} = (1 - \rho_f / \rho_s) \times 100\% \quad (3)$$

The bulk density of the composite (ρ_f) was calculated with Eq.(4):

$$\rho_f = W_0 / V_0 \quad (4)$$

where W_0 is the weight of the composite and V_0 is the volume of the composite.

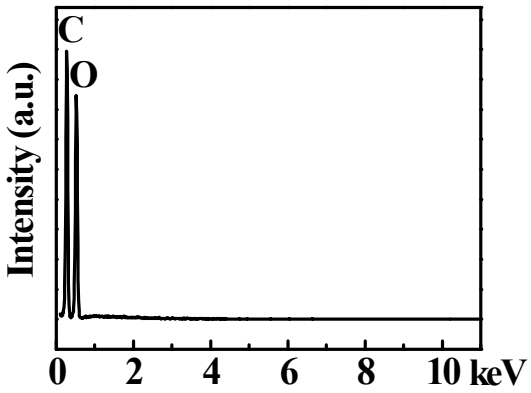

Figure S1 EDS analysis of RC after seven days dialysis

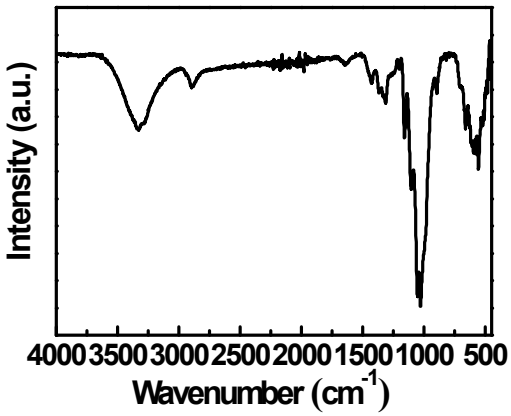

Figure S2 FTIR spectrum of pristine MC

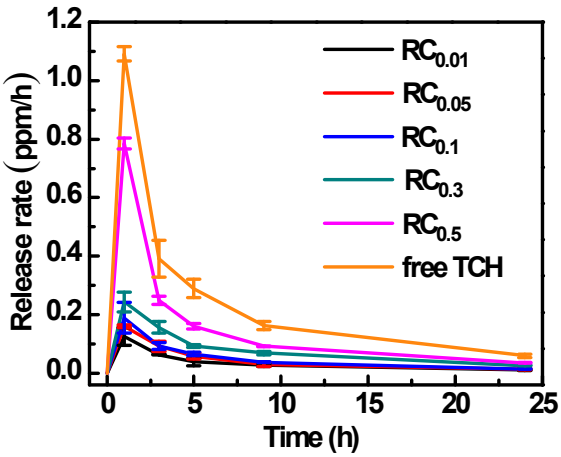

Figure S3 Release rates of TCH in the PBS buffer at pH 7.4 (free TCH is the same amount as $RC_{0.5}$).

Table S1 The thickness, mechanical properties and porosity of RC and its composite films with different TCH loadings.

Samples	Thickness (μm)	Tensile strength (MPa)	Young's modulus (MPa)	Porosity (%)
RC	36.3±0.3	16.51±2.16	1286±226	14.60
$RC_{0.01}$	38.2±0.3	16.62±3.32	1149±230	2.44
$RC_{0.05}$	38.3±0.3	17.10±0.19	1050±251	0.85
$RC_{0.1}$	38.8±0.5	17.16±1.50	1174±168	0.21
$RC_{0.3}$	39.5±0.4	17.25±2.85	1207±140	0.16
$RC_{0.5}$	39.7±0.2	17.25±4.09	1156±71	0.09