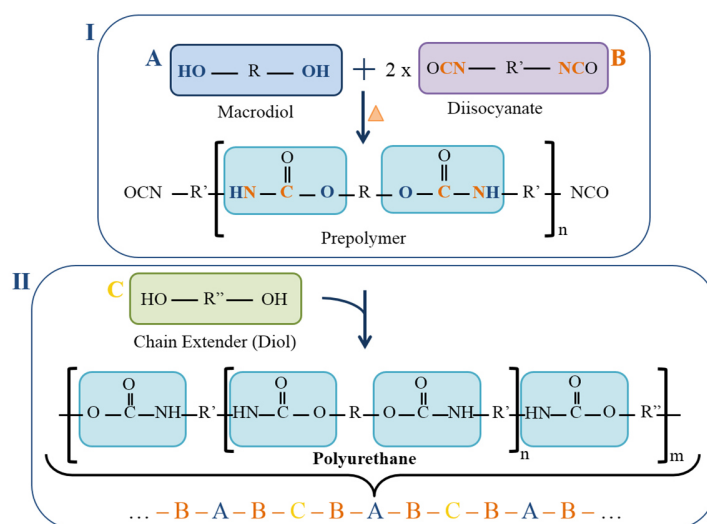


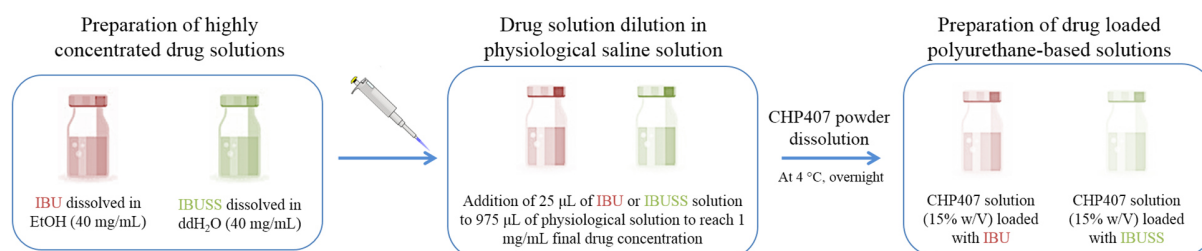
## Supplementary Material

### 1 Poly(ether urethane) synthesis



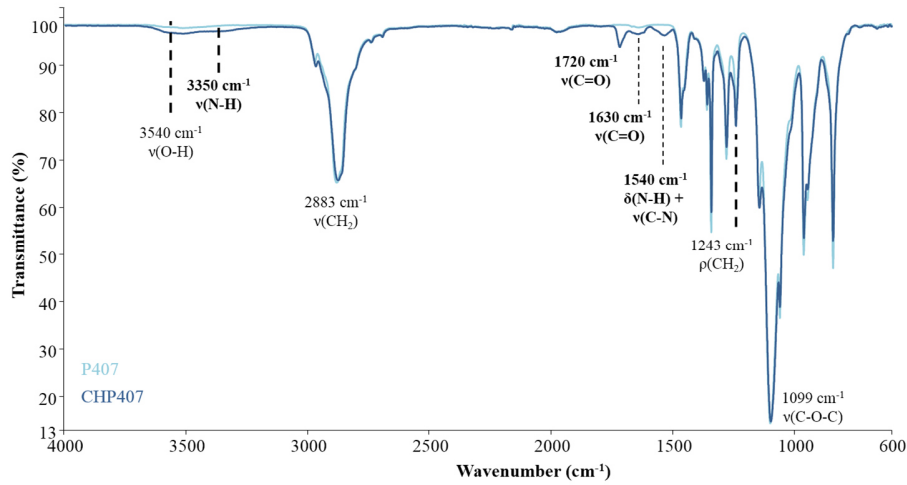
**Supplementary Figure 1.** Schematic representation of poly(ether urethane) synthesis carried out according to a two-step procedure.

### 2 Drug-loaded hydrogel preparation



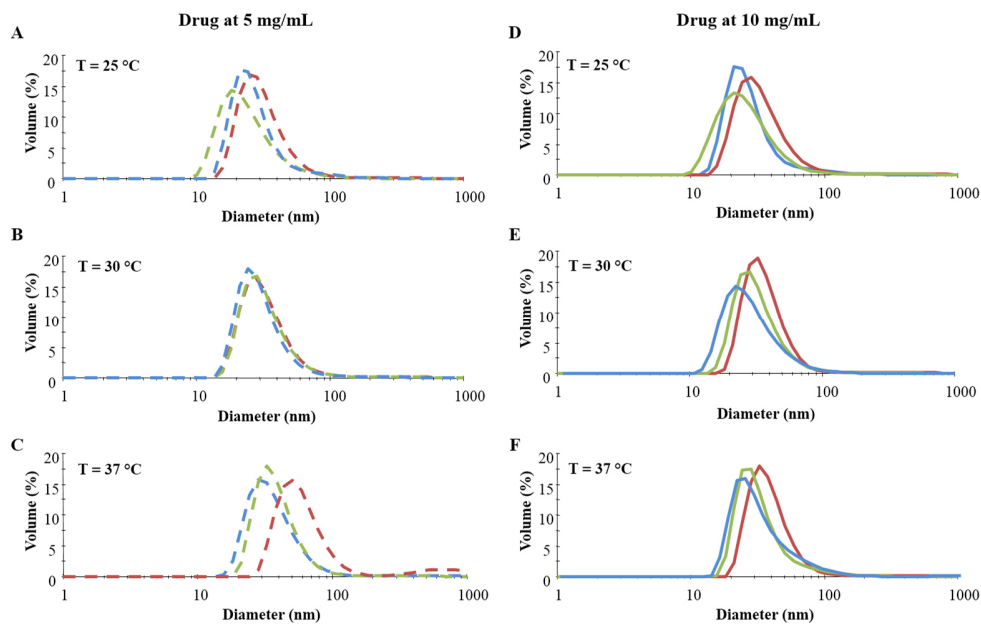
**Supplementary Figure 2.** Schematic representation of drug-loaded hydrogel preparation: drug dissolution at high concentration, drug dilution in physiological saline solution to reach the final desired concentration and polymer solubilisation in drug-containing physiological saline solution.

### 3 Poly(ether urethane) chemical characterization



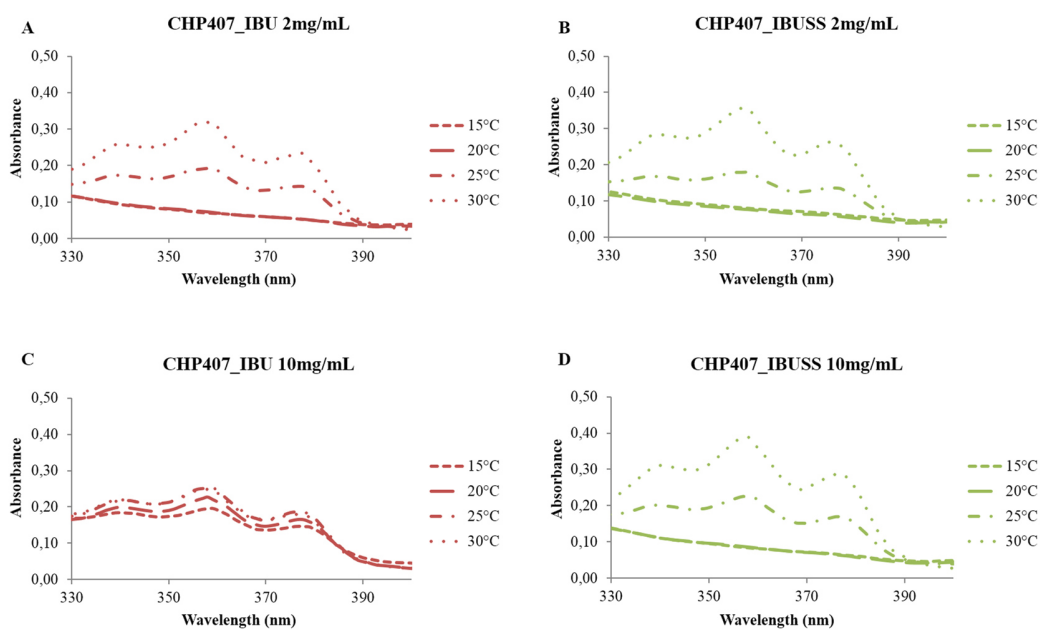
**Supplementary Figure 3.** ATR-FTIR spectra of P407 (light blue) and CHP407 (dark blue). New absorption bands highlighting the success of the synthesis are reported in bold.

### 4 Dynamic Light Scattering

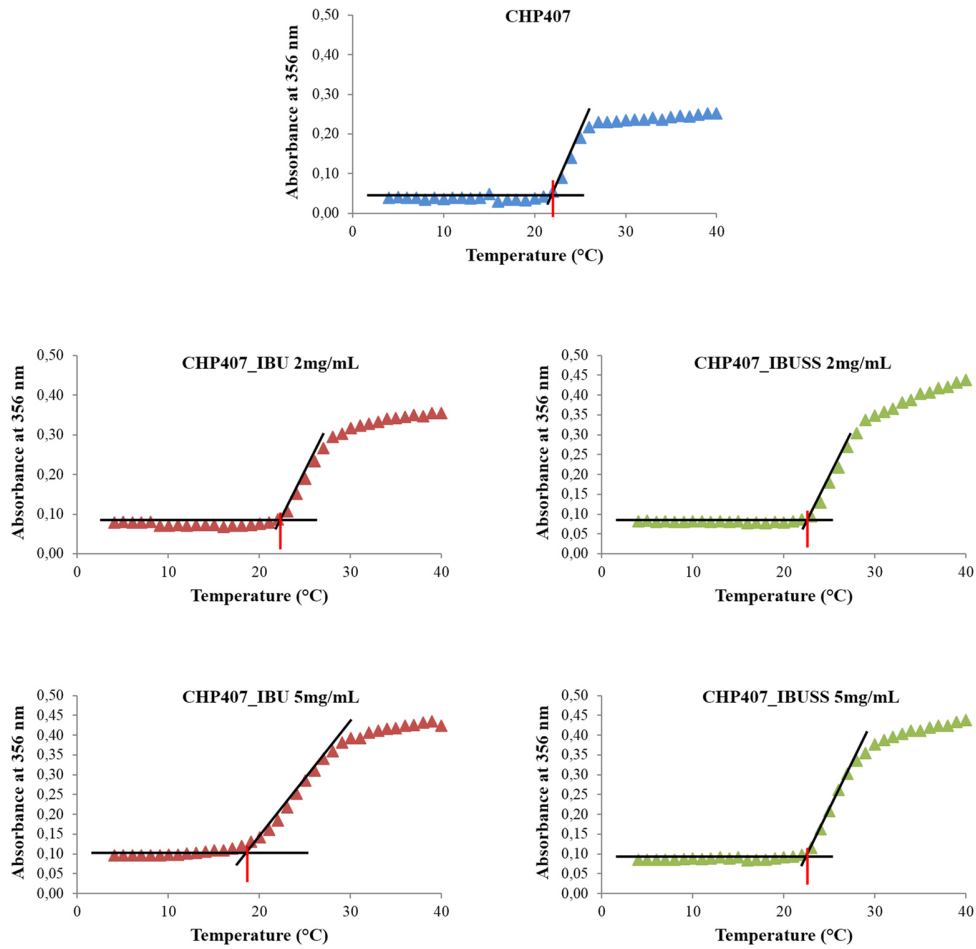


**Supplementary Figure 4.** Distribution patterns (by volume) of micelle hydrodynamic diameter measured in CHP407 solutions at 0.5% w/V concentration not loaded- (blue line) or loaded with 5 and 10 mg/mL of IBU (red line) or IBUSS (green line). Analyses were performed at 25 °C (A, D), 30 °C (B, E) and 37 °C (C, F) ( $n = 3$ ).

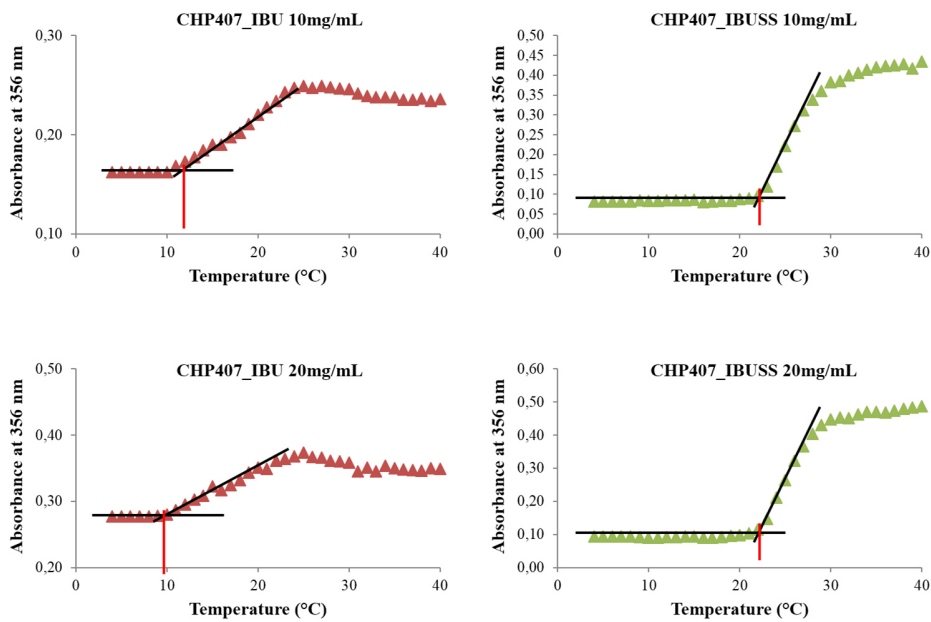
## 5 Critical Micellar Temperature



**Supplementary Figure 5.** UV/Vis spectra of CHP407 solutions at 0.5% w/V concentration loaded with IBU and IBUSS (red and green line, respectively) at 2 mg/mL (A, B) and 10 mg/mL (C, D).

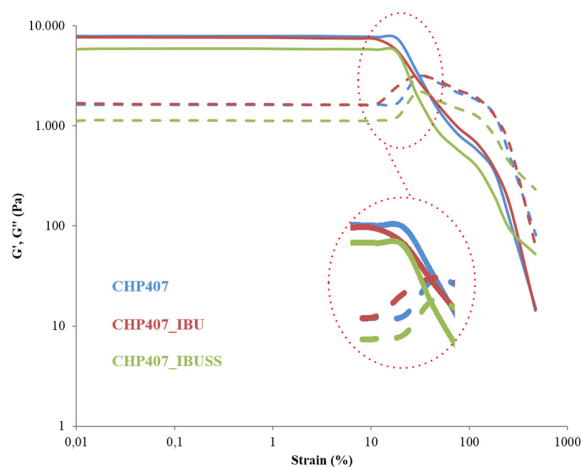


**Supplementary Figure 6.** Sigmoidal curves obtained by plotting the measured absorbance values at 356 nm as a function of temperature for CHP407 solution (blue, 0.5% w/V polymer concentration) and CHP407\_IBU (red) and CHP407\_IBUSS (green) solutions loaded with drugs at 2 mg/mL and 5 mg/mL concentration.



**Supplementary Figure 7.** Sigmoidal curves obtained by plotting the measured absorbance values at 356 nm as a function of temperature for CHP407\_IBU (red) and CHP407\_IBUSS (green) solutions loaded with drugs at 10 mg/mL and 20 mg/mL concentration.

## 6 Strain Sweep Test



**Supplementary Figure 8.** Storage ( $G'$  – continuous line) and Loss ( $G''$  – dashed line) moduli measured at 37 °C as a function of applied deformation in the range 0.01 – 500% for CHP407 (light blue), CHP407\_IBU (red) and CHP407\_IBUSS (green) systems.