

A facile and versatile strategy to efficiently synthesize sulfonated poly(butylene succinate), self-assembly behavior and biocompatibility

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Typical procedure for the synthesis of poly(butylene succinate-co-butylene fumarate) (PBSF) copolyester in bulk

First, 275 g (2.37 mol) of fumaric acid, 426.6 g (4.74 mol) of 1,4-butanediol, and 3.508 g of hydroquinone were fed into a 1000-mL four-neck round-bottom flask equipped with a nitrogen gas inlet, a condenser and a mechanical stirrer. Hydroquinone was used as a radical cross-linking inhibitor. The esterification was carried out at 150 °C under nitrogen atmosphere until theoretical amount of water was separated to give PBF oligomers. Then, a similar procedure was executed to give PBS oligomers. Thereafter, PBF oligomers and PBS oligomers were fed into a 250-mL four-neck round-bottom flask in a 2:3 molar ratio to obtain PBSF40. The condensation polymerization was carried out at 210 °C with Ti(OBu)₄ (0.16 wt %) as the catalyst. Meanwhile, the pressure of the reaction system was gradually reduced to 5–15 Pa. The condensation polymerization was maintained for 2 h. The crude products were dissolved in chloroform and filtered to remove impurities. The chloroform soluble parts were concentrated and then precipitated in an excess amount of methanol. The precipitates were collected and dried in vacuum oven at 50 °C for 24 h before use.

Micelles preparation and their encapsulation of Nile Red

First, 21 mg of SPBS was dissolved in 7 mL of DMF at ambient temperature. Then 7 mL of water was added dropwise into the solution under magnetic stirring. After stirring for 6 h, the solution was dialyzed against deionized water in dialysis membrane (MWCO 8 kDa) for 3 days to remove the solvent of DMF. The final polymer concentration was adjusted to 1.0 mg mL⁻¹. For the micelles loaded with Nile Red, 21 mg of SPBS and 0.21 mg of Nile Red were dissolved in 7 mL of DMF firstly. The rest of the procedure was the same with that of micelles without loading.

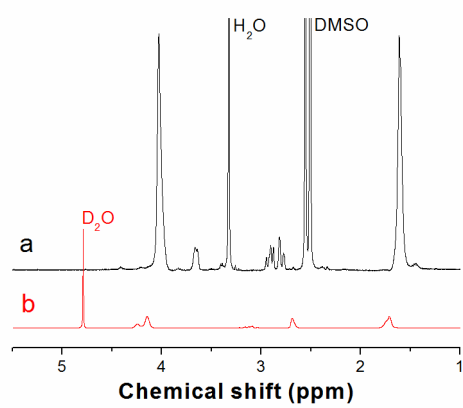


Fig. 1S ¹H NMR spectra of SPBS40 in DMSO-*d*₆ (a) and D₂O (b).