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Double emulsion template suspension polymerisation: towards the synthesis of polyelectrolyte core porous hydrophobic shell particles for environmental applications

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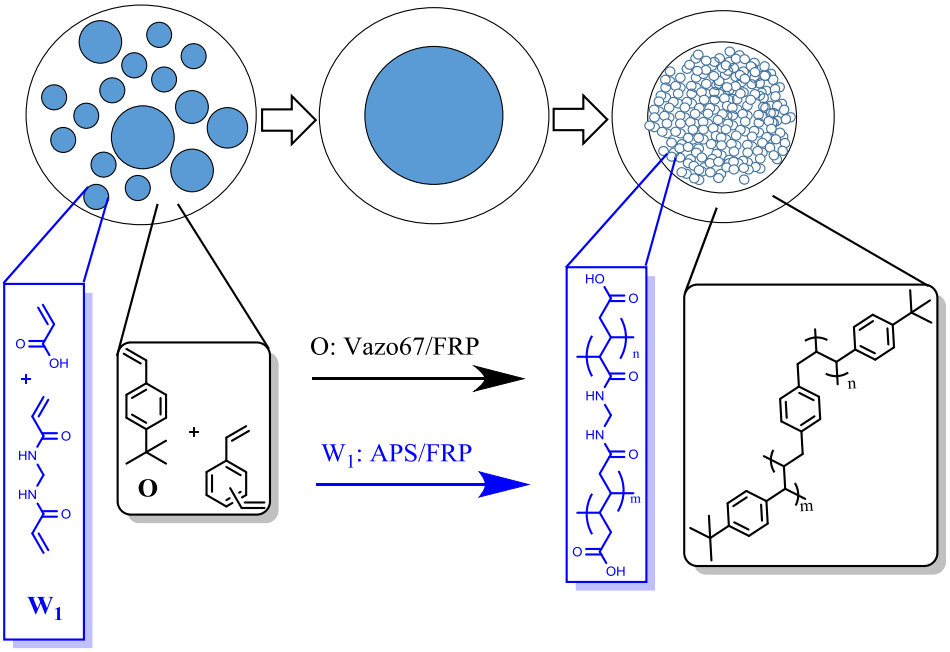

Scheme 1: Scheme representing the mechanism of formation of core-shell particles with polyelectrolyte cores. The arrows represent the simultaneous free radical polymerisation (FRP) of monomer contained in the internal aqueous (blue) and oil phase (black) respectively. Vazo67: 2,2'-Azobis(2-methylbutyronitrile) oil soluble initiator, APS: ammonium persulphate aqueous soluble initiator.

Table T1: Composition of double emulsion phases.

Component	Amount		
Internal aqueous phase		W_1	
DI water	0.40 g	22.20 mmol	30.30 wt. %
Acrylic acid 99 %	0.80 g	10.99 mmol	60.61 wt. %
N,N'-Methylenebisacrylamide	0.08 g	0.51 mmol	6.06 wt. %
Ammonium persulphate	0.04 g	0.17 mmol	3.03 wt. %
Hydrophobic phase		**O**	
4-*tert*-butylstyrene ≥ 99%	2.10 g	12.19 mmol	46.67 wt. %
Divinylbenzene 80%	0.90 g	5.53 mmol	20.00 wt. %
2,2'-Azobis(2-methylbutyronitrile)	0.30 g	1.56 mmol	6.66 wt. %
Sorbitan monooleate	1.20 g	2.80 mmol	26.67 wt. %
External aqueous phase		**W_2**	
DI water	200 ml	-	98.04 wt. %
Poly(vinyl alcohol) Mw ~ 130 kDa	4.00 g	-	1.96 wt. %

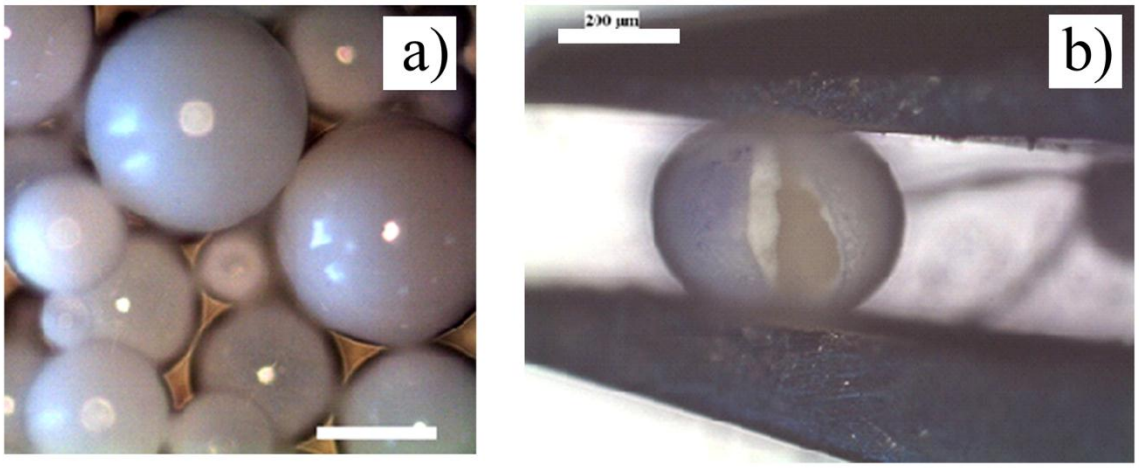

Figure S1: Optical micrograph of porous core-shell particles a), mechanically compressed particle b). The scale bars represent 200 µm.

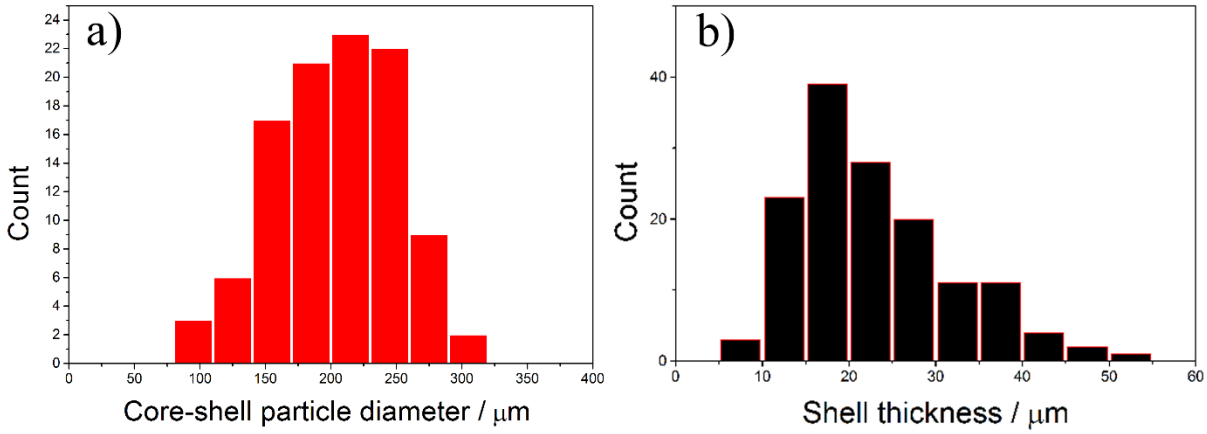

Figure S2: Core-shell particle diameter histogram a) and shell thickness histogram b).

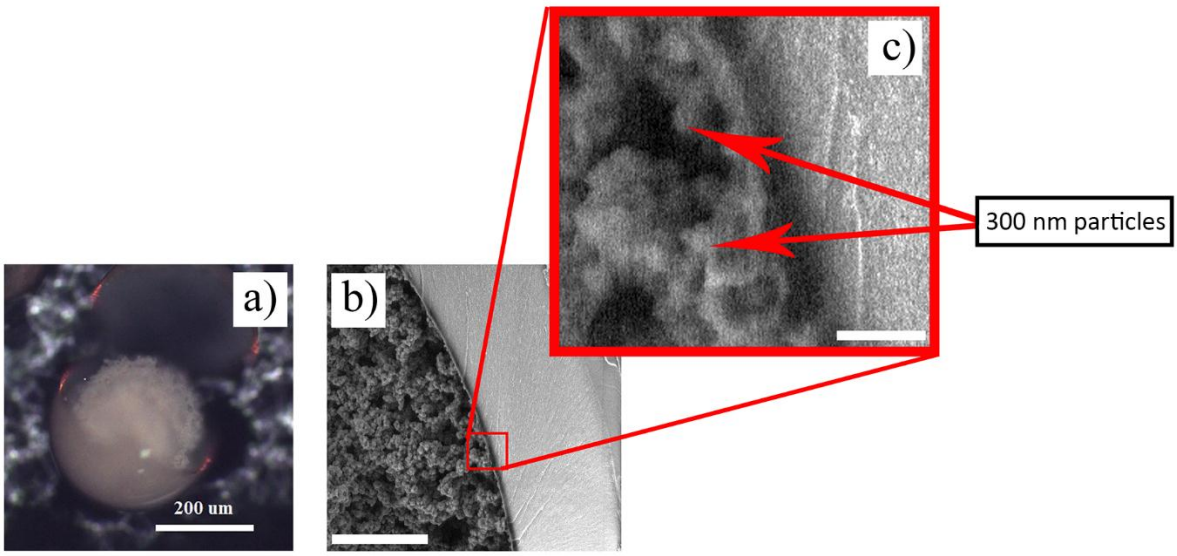

Figure S3: Optical micrograph of a non-porous core-shell particle obtained using 10 wt. % of Span 80 in O phase a), scanning electron micrograph of a non-porous core-shell particle b), and high magnification of core region c). The scale bars in the micrographs represent 200 μm, 10μm, and 1μm respectively.

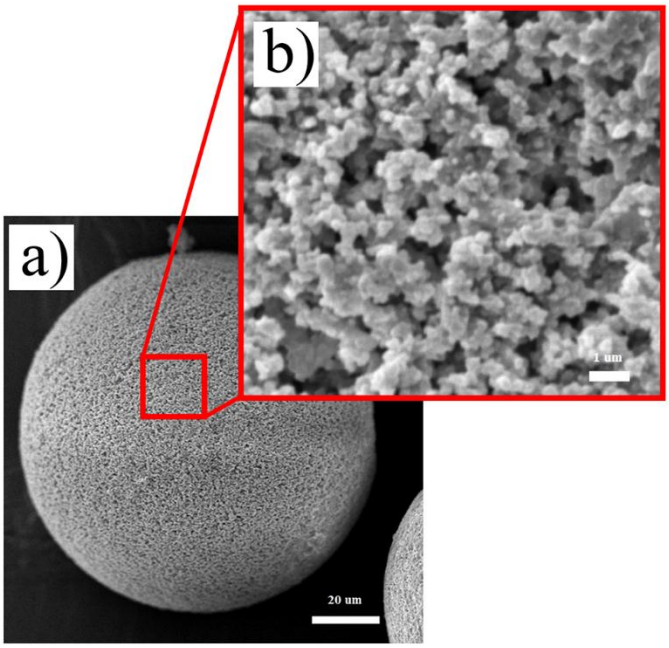

Figure S4: Scanning electron micrograph of porous core-shell particle a), and high magnification micrograph of a porous shell b). The scale bars represent 20 µm and 1 µm respectively.

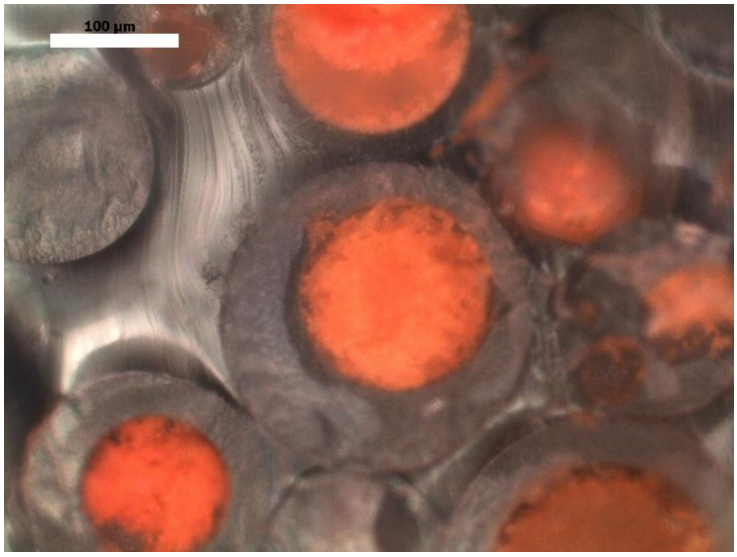

Figure S5: Optical micrograph of cross-sectioned core-shell particles filled with Rhodamine 123 cationic dye embedded in epoxy resin. Scale bar represent 100 µm.