

Hydrophilic polyelectrolyte microspheres as a template for poly(3,4-ethylenedioxythiophene) synthesis

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EXPERIMENTAL

Conductometric Titration. Conductometric titration was performed on 50 mL of the purified particle dispersion at 25°C in an atmosphere of purified nitrogen. During the measurements the content of the titration vessel was stirred with a magnetic stirrer continuously. The solid content of the particles was 0.1 g. The titrations were done with 0.01 M NaOH solution. The conductivity was measured using a conductivity dip cell and a Seven Multi (Metler Toledo, Switzerland) conductivity meter. Samples for potentiometric titration contained 10^{-4} M NaCl as an indifferent electrolyte; SevenMulti pH meter was used for pH measurements. The samples of the particles were titrated three to four times and the average value was used (experimental error less than 2%).

To determine the extent of hydrogen and hydroxyl ions adsorption as a function of pH an equal volume of blank electrolyte was titrated at the same conditions as the latexes. For this purpose the difference of the concentrations of potential determining ions (H^+ , $-OH^-$) between the particles and the blank electrolyte was determined.

Purification of the resulting PEDOT complexes and polyelectrolyte microspheres. The crude polymer dispersion was purified by exhaustive dialysis (Orange Scientific; molecular weight cut-off = 12-14 kDa) for 3 days to remove the residual monomers and the surfactant. As a result, sulfonate-containing microspheres (PSS) were obtained. The dry residue (D.R.) was determined by gravimetric analysis: 1 mL of latex was dried to constant weight.

The synthesis of 3,4-ethylenedioxythiophene (EDOT) was carried out according to the following procedure: 56 μ l (0.53 mmol) of EDOT and 2 ml of ethanol were mixed in a bottle, after which 4.6 ml of HCOOH (>95%) was added (HCOOH/EDOT ratio = 75, w/w). 0.1 g of polymer template was placed into the resulting solution. The reaction was carried out at room temperature for 10 days. Then the polyelectrolyte complexes were washed with ethanol.