Experimental Section

Materials: (+)-Biotinyl-3,6-dioxaoctanediamine was obtained from Pierce and (+)-biotin from Fluka. (Benzotriazol-1-ylloxy)tris(dimethylamino)phosphonium hexafluorophosphate, fluorescein biotin, streptavidin, biotinamidocaproyl labeled ferritin and streptavidin-peroxidase conjugate were purchased from Sigma. Streptavidin rhodamine Red™-X conjugate was obtained from Molecular Probes. Carboxy terminated polystyrene was synthesized according to a literature procedure.[1]

Monolayer experiments: The biotinylated polymer 1 was spread from a chloroform solution on the air/water interface of a thermostatted (20.0 ± 0.1°C) double barrier R&K trough (6×25cm). A buffer (tris, pH 7.0) was used as subphase. The layers were compressed at 0.7cm² min⁻¹. The surfaces of the compressed monolayers at the air/water interface were investigated with the help of a Brewster Angle Microscope (NFT BAM-1). After transfer to a substrate (formvar coated copper grids, highly ordered pyrolytic graphite (HOPG) or hydrophobic glass) by the Langmuir-Schaefer technique, further studies with TEM (JEOL JEM-1010, 60kV), AFM (DI Nanoscope IIIa and Thermomicroscopes Lumina) and confocal fluorescence microscopy (Thermomicroscopes Lumina, λex = 488 and 543nm) were performed.

Synthesis of 1: 350 mg (0.036 mmol) of carboxy terminated polystyrene, 20 mg (0.053 mmol) of biotinyl-3,6-dioxaoctanediamine and 0.06 ml Et₂N were dissolved in 15 ml distilled DMF. Subsequently, 22 mg (0.050 mmol) of (benzotriazol-1-ylloxy)tris(dimethylamino)phosphonium hexafluorophosphate was added. After stirring for 16 hrs at room temperature under a nitrogen atmosphere the solution was precipitated in 600 ml MeOH. The crude product was further purified by column chromatography (MeOH/CH₂Cl₂, 2:98 v/v); yield 142 mg (0.015 mmol; 43%) of 1. Mₙ = 9147; Mw/Mn = 1.03; 13C NMR (300MHz, CDCl₃, 25°C, TMS): δ = 173.6, 164.0, 146.4-145.6, 128.3-125.9, 70.3-69.8, 62.0, 60.4, 55.6, 49.7, 46.7-40.6, 39.5, 39.3, 36.1, 31.0, 30.0-29.8, 28.3, 25.7, 20.1-18.5, 17.9, 11.5-11.1.

References