Synthesis and Self-assembly of a DNA Molecular Brush

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Supporting Information

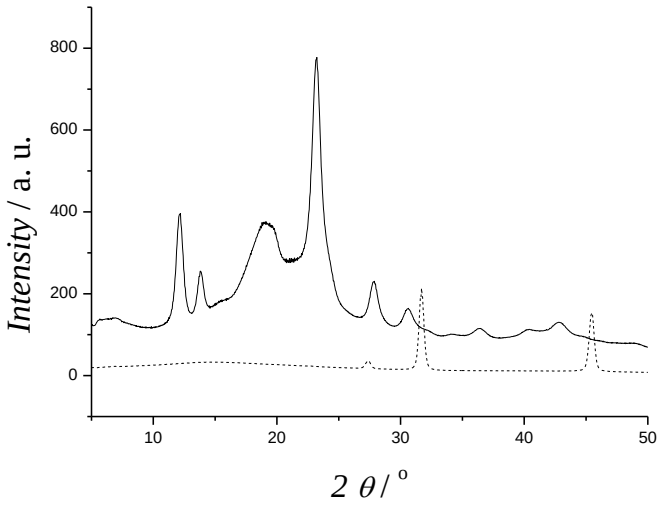


Figure S1. *X-ray diffraction curve of freeze-dried precipitate of PBOX, prior to (dashed line) and subsequent to crystallization (solid line) of a 1 wt% polymer solution in ethanol–water 55:45 (w/w) at room temperature*

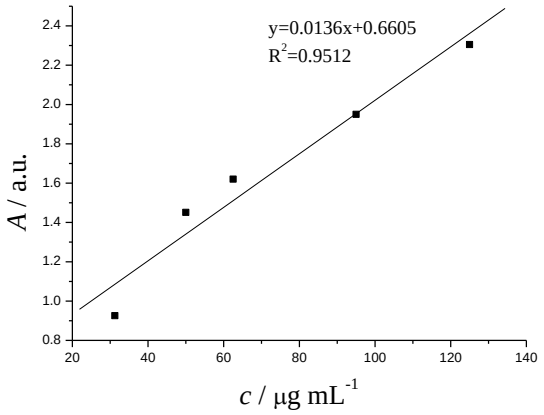


Figure S2. Absorbance calibration curve of the nucleic acid sequence recorded at 268 nm.

UV-Vis grafting density estimation. PBOX absorbance at 268 nm is negligible

For a representative quantification of the grafting density: absorbance value at 268;

A_{268}= 1.809

Thus, concentration is equal to;

x= (1.809-0.6605)/0.0136= 84.5 µg mL^{-1}

Concentration for measurement; 0.1 mg mL^{-1}, volume; 1mL

m_{DNA}=84.5 µg

M_{PBOX} = 5381.45 g mol^{-1}

M_{DNA}=3709.9 g mol^{-1}

m_{PBOX} = 100-84.5 =15.5 µg

n_{PBOX} =15.5*10^{-6}/ 5381.45 = 2.9 nmol

m_{DNA} =84.5µg

n_{DNA} = 84.5*10^{-6}/3709.9 = 22.8 nmol

n_{DNA} / n_{PBOX} = 7.86 ≈ **8** DNA strands for one PBOX chain

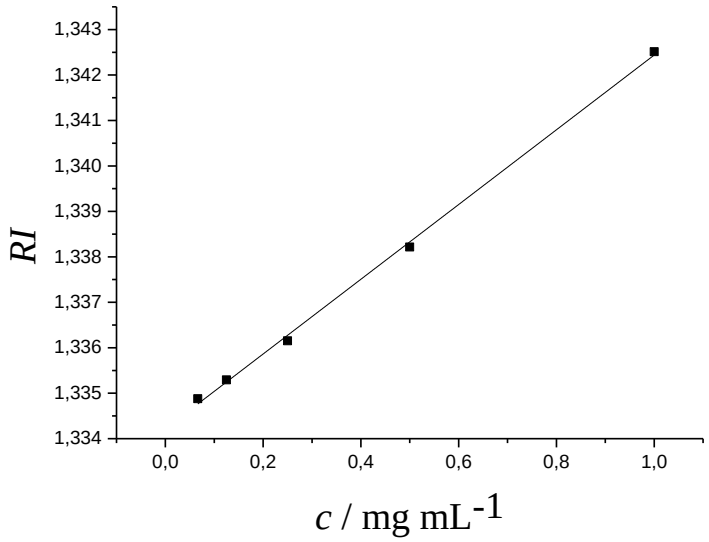


Figure S3. *Refractive index (RI) dependence on concentration (c):* $\frac{\mathrm{dn}}{\mathrm{dc}} = 0.0082\ \mathrm{cm}^3 g^{-1}$

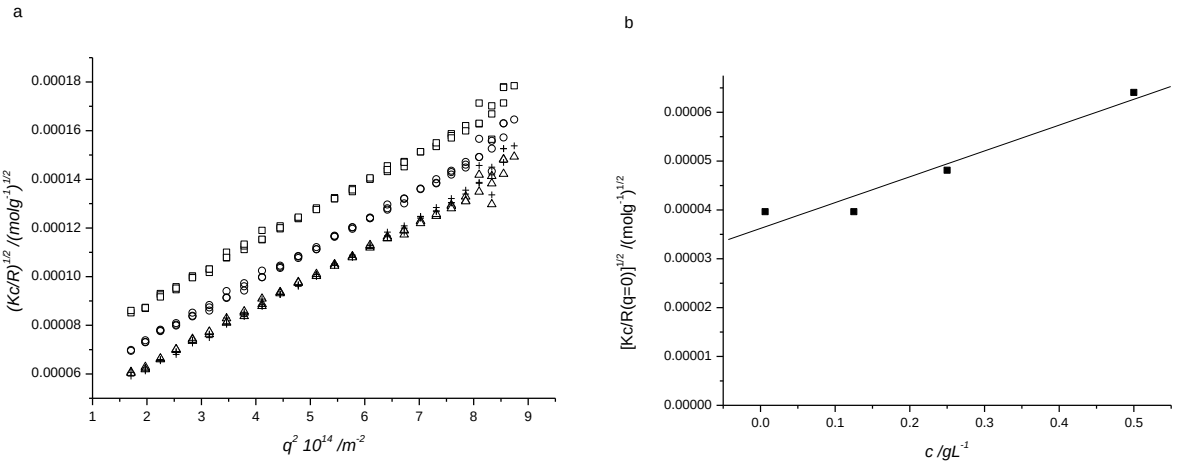


Figure S4. *Berry analysis of the scattered intensity as assessed by static light scattering a) angle dependence for □) 0.5, ○) 0.25, Δ) 0.125 et +) 0.00625 gL^{-1}; b) concentration dependence subsequent to 0 angle extrapolation*

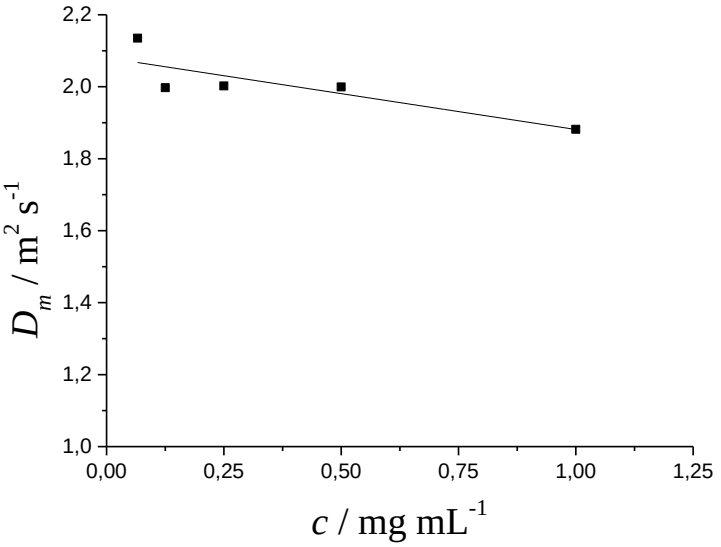


Figure S5. *Concentration dependence of the mutual diffusion coefficient as measured by dynamic light scattering*

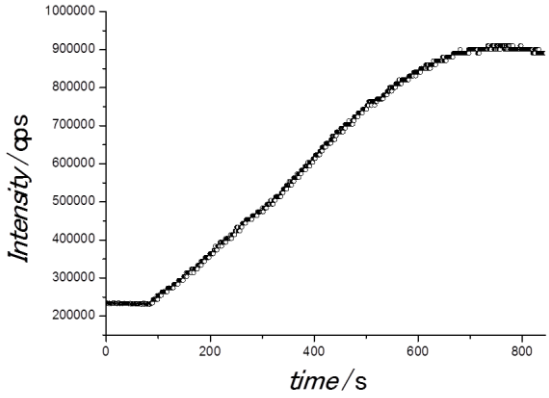


Figure S6. *Time course of the fluorescein fluorescence intensity subsequent to encapsulation (concentration) and release by addition of sodium azide*

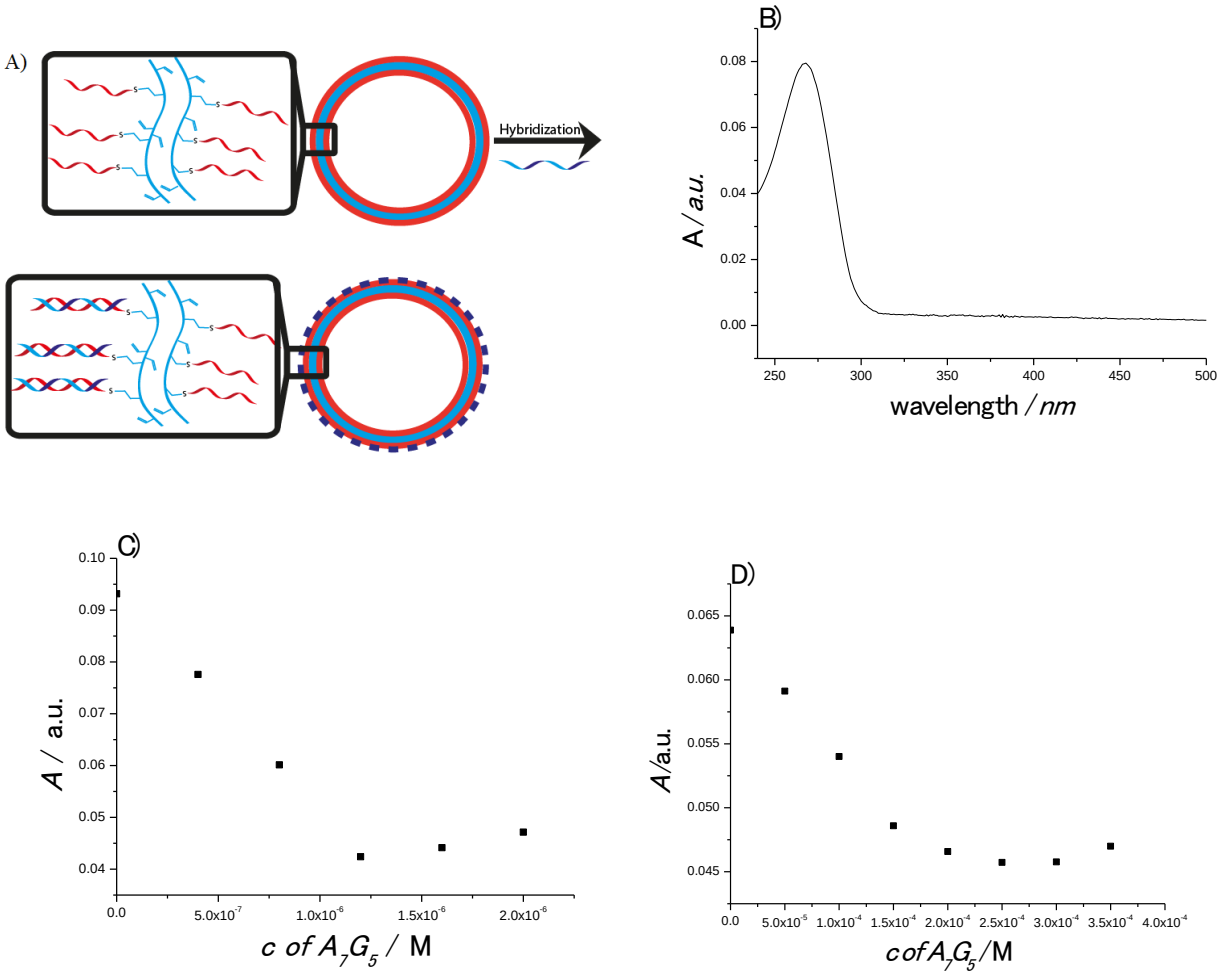


Figure S7*. A) Schematic representation of hybridization. B) Representative spectrum which rules out hindrance owing to scattering C) Titration upon hybridization (maximum absorbance at 268 nm) D) Control hybridization of free C_5T_7 with A_7G_5. Efficiency 100%: all complementary sequences did hybridize*

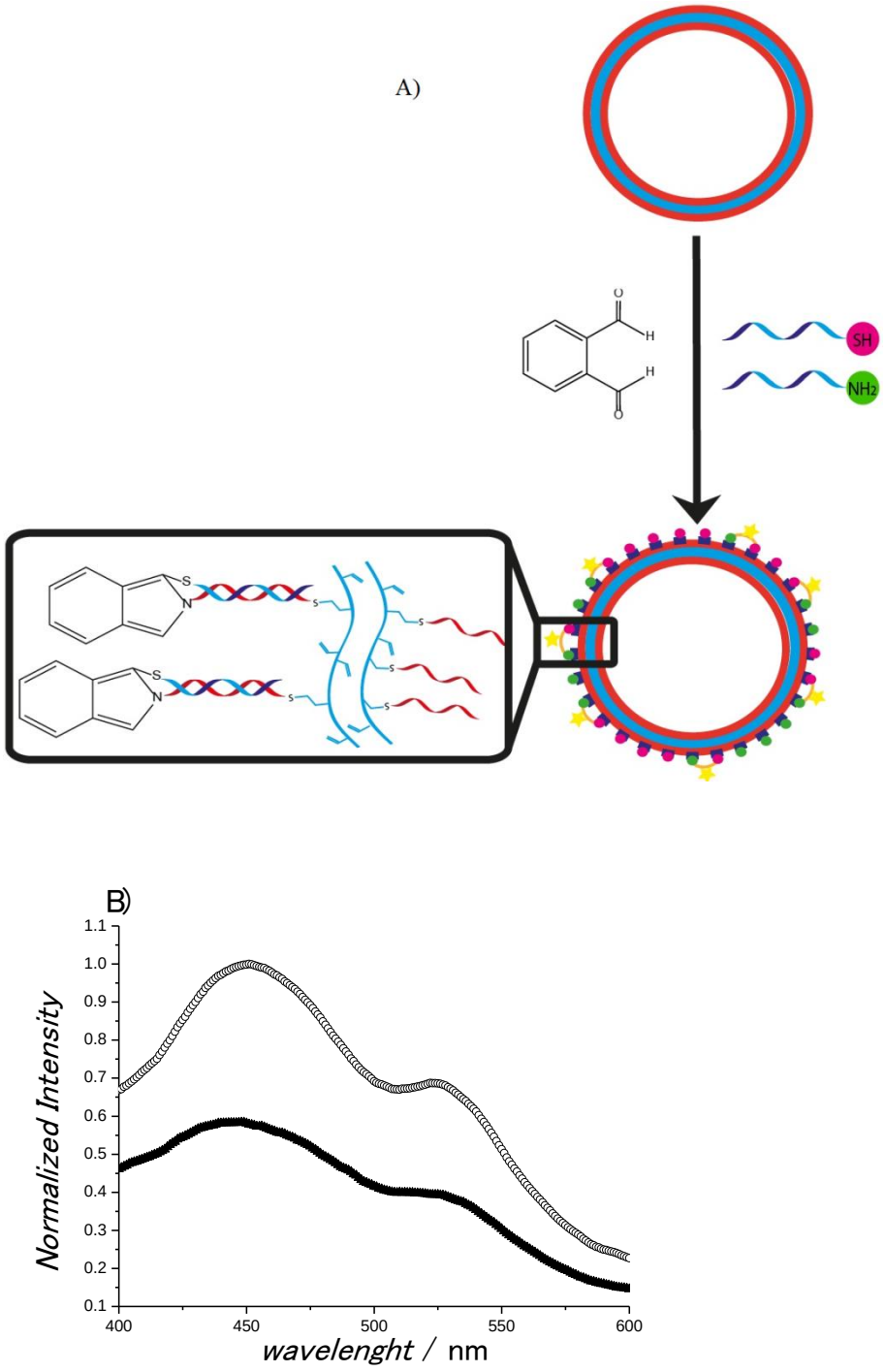


Figure S8. *A) Schematic representation of isoindol reaction; B)Fluorescence spectroscopy upon isoindol formation at the surface of PBOX spheres, ▲) initial stage of reaction , ○) reaction completed*

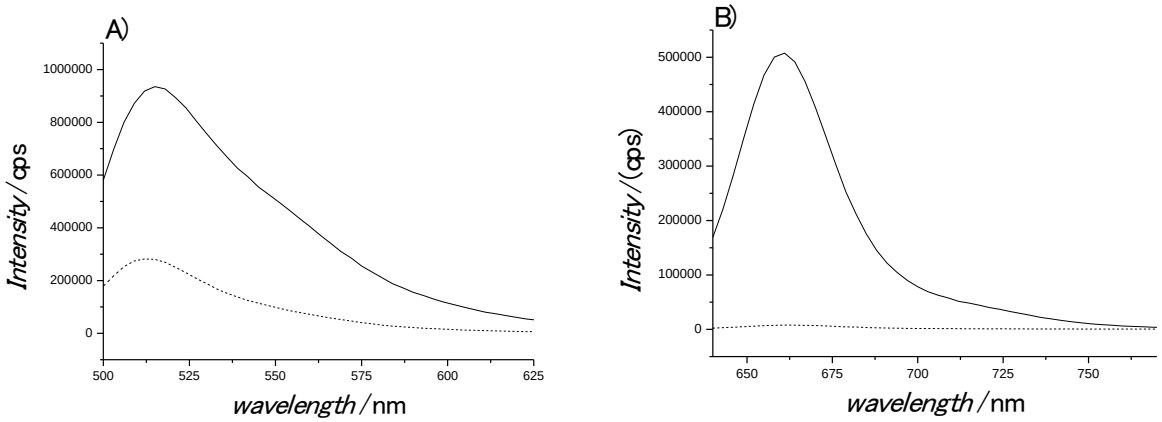


Figure S9. *Fluorescence intensity spectra upon speciation (solid line: before washing; dotted line: after washing) of a solution of PBOX-g-DNA self-assembled structures incubated with the complementary sequence stained with A) FITC which hybridizes with the nucleic acid grafts engaged in self-assembly and B) the non-complementary sequence labeled with Cye5 which remains in solution before washing (background). Subsequent to washing, the complementary sequence stained with FITC hybridizes with the PBOX-g-DNA composing the self-assembled structure, being the non-complementary sequence removed during the washing process (no background).*

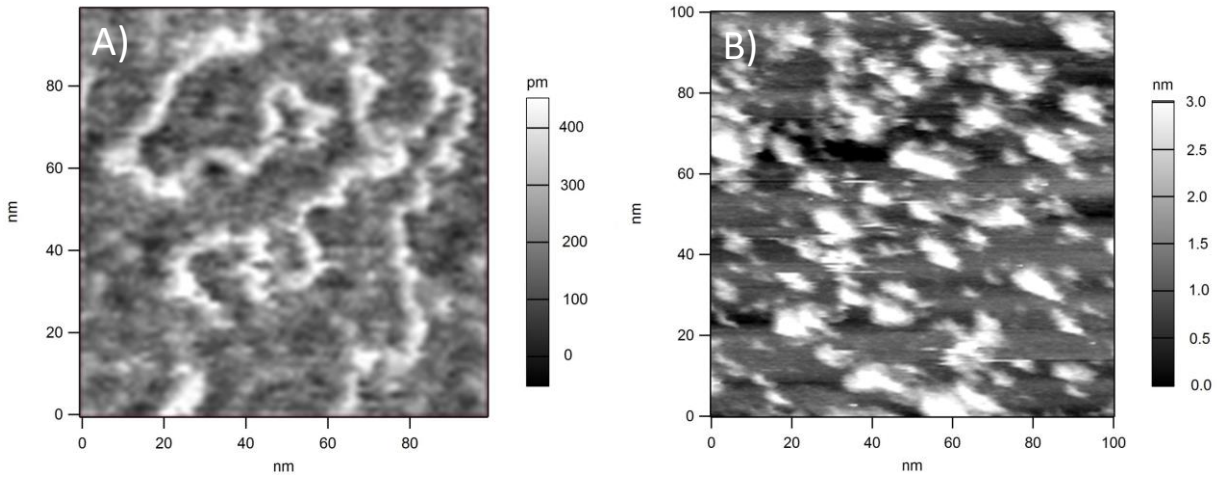
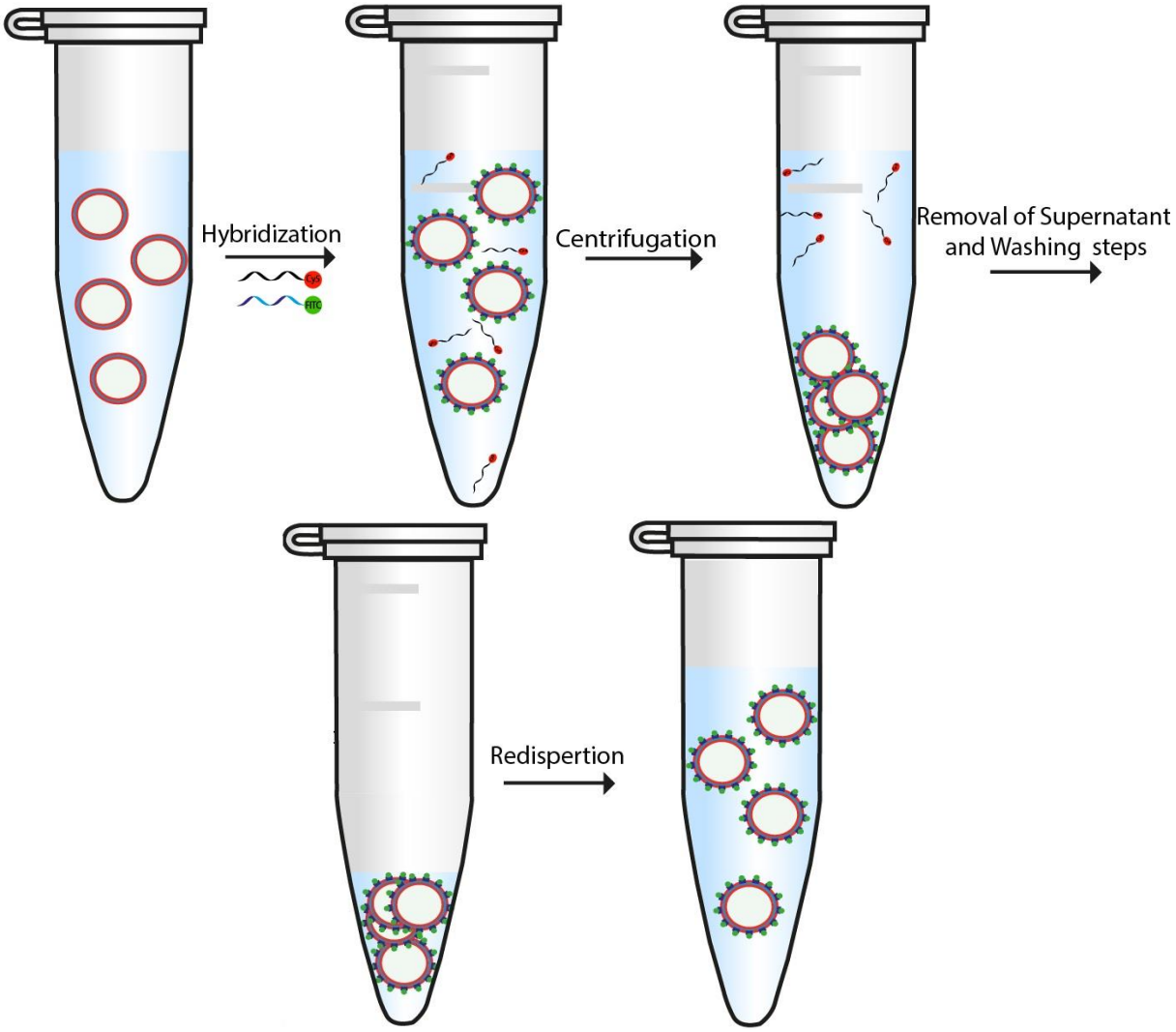


Figure S10. *Atomic force microscopy imaging of A) molecularly dissolve PBOX polymer chains adsorbed on micaB) PBOX-g-DNA copolymer adsorbed on mica*



Scheme S1. *Procedure for sorting out nucleotides sequences with the use of PBOX-g-DNA spheres.*

Wavenumber (cm^{-1})	Assignments
920	Vinyl C=CH2
970	P-O in (R-O)2-PO2 upper band
1064	P=O in $(R\text{-}O)_2\text{-}PO_2$ lower band
1226	P=O in (R-O)2-PO2 upper band
1471	N-H streching
1652	C=O amide I

Table S1*: Significant FTIR vibration bands and their corresponding wavenumbers*