Electronic Supplementary Material (ESI) for ChemComm.

Supporting Information for

Silica Core/Conjugated Polymer Shell Particles *via* Seeded Knoevenagel Dispersion Polymerization - Laser Action in Whispering Gallery Mode Resonators

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Experimentals:

Materials: All reagents and solvents were purchased from Sigma-Aldrich, Merck Chemicals or VWR. The commercially available materials were used without additional purification.

Synthesis:

Functionalization of SiO_2 particles

The silica particles were purchased with amines on the surface dispersed in water (50 mg/ml). To further functionalize these particles for use as seed particles they were transferred to ethanol by repeated washing with ethanol. The 2-methoxy-5-(2′-ethylhexyloxy)terephthalaldehyde (200 mg) and two drops of acetic acid were added to the mixture. The reaction was stirred for three hours under reflux.

Preperation of core-shell hybrid particles

Equimolar amounts of 2-methoxy-5-(2′-ethylhexyloxy)terephthalaldehyde and 2-methoxy-5-(2′-ethylhexyloxy)benzene-1,4-diacetonitrile were dissolved in 2 ml 1-propanol and mixed with the stabilizer solution, which consists of 460 mg Poly(1-vinylpyrrolidone-co-vinyl acetate) and 92 mg Triton X-45 in 2,6 ml 1-propanol. 1ml of the functionalized SiO_2 particle dispersion in 1 propanol (20 mg/ml) was added to the monomer/stabilizer solution. The mixture was degassed for 5 min by bubbling with argon. The polymerization was initiated by adding 1.4 ml of a degassed potassium-*tert*-butoxide solution in 1-propanol (28 mg/ml). The polymerization was carried out at room temperature overnight. The achieved hybrid particles were purified by centrifugation and washing four times with 1-propanol.

Nuclear magnetic resonance (NMR): NMR spectra were measured on a Bruker AVX400 (400 MHz). The coupling constants *J* are stated in Hz.

Electron microscopy: was performed on a Hitachi UHR FE-SEM SU9000 and on a Hitachi S-4800 field emission microscope, operating between 2.0 kV and 5.0 kV. The samples were deposited onto glass substrates, dried in air at 30°C and sputtered with a 1-3 nm thick layer of gold. The images were analyzed using ImageJ image analysis software.

Confocal Microscopy: Fluorescence measurements of the core-shell particles were performed on a confocal microscope (Leica TSC SP8 tandem). The excitation wavelength was 405 nm.

Laser spectroscopy:

The dispersions of the core-shell microspheres P1-4 were deposited as droplets on cover glasses and dried at ambient conditions. For laser experiments an AIQTEC MIS 1000 imaging spectrometer was applied featuring a frequency tripled Nd-YAG laser as the optical pumping source with a pulse duration of 10 ns at a repetition rate of 10 Hz. The excitation wavelength was down-converted using an OPO to access the entire range of the visible spectrum with nanometer precision. The laser beam was coupled into an inverted microscope with a 40X objective where the samples were exposed and imaged. The sample is imaged through the same objective and then guided to an imaging CCD camera or a spectrometer. The intensity of the laser beam was tuned by inserting optical density filters into the beam before it hit the samples. The photoluminescence spectra were averaged over 50 laser pulses to determine the lasing thresholds of microsphere assemblies and single-particle emission spectra were averaged over 5 pulses. Images of the single core-shell particles were taken above their lasing threshold.

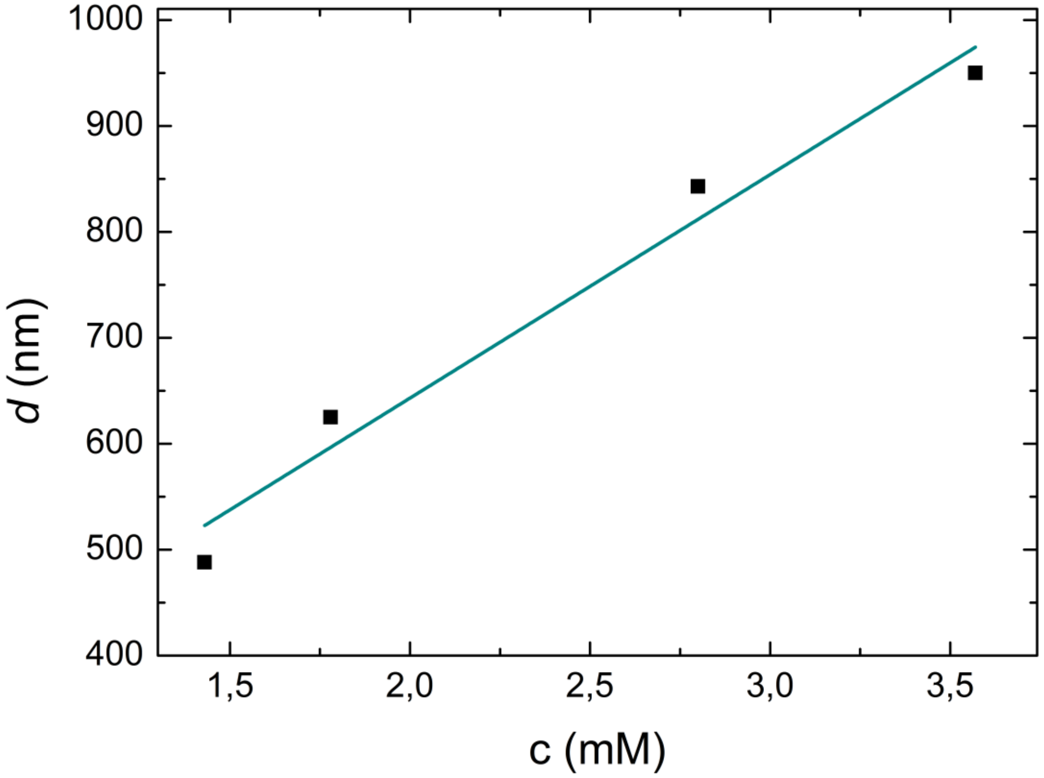

Figure S1 monomer concentration vs polymer shell

Table S1: Molecular weight distributions.

Polymer	M_w [kDa]	PDI
P1	3.5	2.48
P2	4.1	2.97
P3	4.7	2.95
P4	20.0	2.48