Supporting Information

Determination of the molar mass of the copolymer

SLS measurements were performed at a temperature of 25 °C on a Malvern CGS-3 apparatus equipped with a He-Ne laser with a wavelength of 632.8 nm. 3 solutions of the copolymer in 0.5M NaCl with concentrations ranging from 0.5 to 2 g/L were measured at different angles from 30° to 150°. The Mw of the polyelectrolyte was deduced from a Zimm analysis of the collected data.

The refractive index increment, dn/dc, at 25°C was measured with a refractometer Mettler Toledo RE40D and was 2.10^{-4} L/g.

Ellipsometry measurements

Because the silver containing multilayered polyelectrolyte films were rapidly opaque, the determination of their thickness by ellipsometry is not straightforward. Therefore, non silver loaded [P(DOPA)-*co*-P(DMAEMA$^+$)/PSS]n multilayer films were prepared under the same conditions, and the theoretical models valid to transparent films were used to determine the film thickness. Figure S1 shows the evolution of the thickness of [P(DOPA)-*co*-P(DMAEMA$^+$)/PSS]n films prepared by the dipping method. The film thickness increased linearly at least up to 15 bilayers. The bilayer deposition was thus reproducible all along the process. On the assumption that the silver particles do not contribute significantly to the thickness of the multilayered film and do not change significantly the conformation of the chains, the extrapolation of the ellipsometric data to a 60 bilayers containing film predicts a thickness of 120 nm. This may be a crude assumption, but which gives an estimation of the order of magnitude of the film thickness.

Ellipsometry was carried out with a GES-SOPRA ellipsometer operating in the UV-visible-NIR (250-1000 nm) spectral range with a wavelength resolution of 10 nm and an incidence

angle of 75°. The experimental data were fitted with an optical model for an ideal film, i.e., superposed layers of well defined thickness and optical constants, separated one from each other by flat and parallel interfaces. Being exceedingly much thicker than the polyelectrolyte layers, the stainless steel substrate (1 mm thick) was considered as a bulk material with pseudo optical constants. Because the optical constants of the deposited films were unknown, the index of refraction was estimated by a Cauchy dispersion relationship, with 1.465 for the A value. Simulation and non-linear least squared regression analysis were used in the fitting of the experimental data with the values of cos ψ and tan Δ calculated by the optical model.

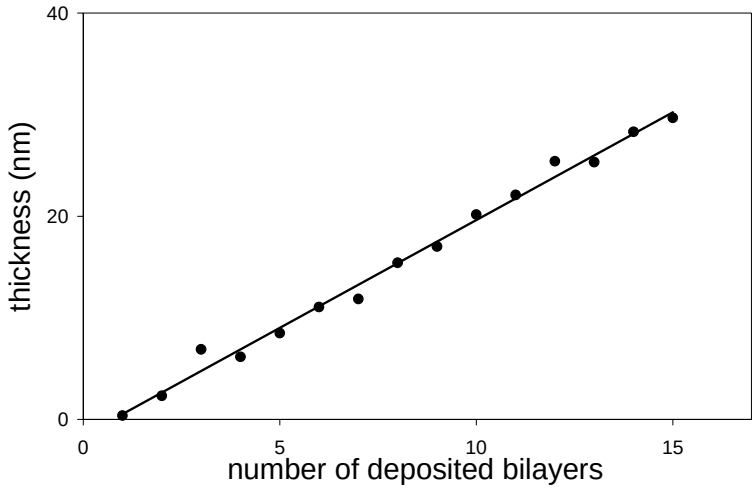

Fig. S1 : Evolution of multilayer thickness as a function of the number of deposited P(DOPA)-*co*-P(DMAEMA$^+$) (7 g/L) /PSS (7 g/L) bilayers