## **Supporting information**

**Figure 1. Gel-permeation chromatography of 28 kDa PLL.** 1 mL of a 6 mg/mL PLL solution was injected into the Sephadex G200 column equilibrated with Tris-buffer. Column volume was 32 mL. The chromatography was performed at an elution rate 1.1 mL.min<sup>-1</sup> under a pressure difference of 1 atm. The 0.5 mL fraction of PLL corresponding to the elution volume of 20 mL was collected and used for covering of vesicles of PS-latexes.



**Figure 2. Separation of PLL-covered liposomes from unbound PLL.** 1 mL of a final suspension of PLL-covered vesicles or latex particles was chromatographed on Sephadex G200. Column volume was 32 mL. Chromatography was done at an elution rate of 0.9 mL min<sup>-1</sup> under a pressure difference of 1 atm. Light absorption of the eluted solutions (at a wavelength of 220 nm) and fluorescence (excitation and emission wavelengths were set 490 and 520 nm, respectively) were registered.

The peaks corresponding to vesicles and to free PLL are well resolved. The fraction of PLL-free polymer-stabilized vesicles was collected and used for adsorption on the surface of oppositely charged (PLL/HA)<sub>12</sub> films (see section "Preparation of PLL/HA films with integrated vesicles or PS-latexes" of the main manuscript).

Chromatography (left vertical axis) and fluorescence (right vertical axis) profiles of Lip-PLL injected into a Sephadex G200 column are presented in the Figure 2. Chromatography profiles for PS latex particles are similar allowing one to separate PLL-covered particles and free PLL.



Figure 3. Analysis of the PLL/HA film growth by QCM. PLL/HA film formation for HA of fixed molecular mass (400 kDa) and PLL of different viscosity averaged molecular masses (28 and 280 kDa) was studied. Shifts of crystal frequency divided by the overtone number ( $\Delta F/v$ ) during the alternate deposition of PLL and HA on the crystal.  $\Delta F/v$  or  $\Delta D/v$  at v = 1, 3, 5, 7 for films constructed with PLL280 and PLL28 are depicted with the symbols  $\blacksquare$ ,  $\bullet$ ,  $\blacktriangle$ ,  $\blacktriangledown$  and  $\Box$ ,  $\circ$ ,  $\Delta$ ,  $\nabla$ , respectively.



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## Figure 4. Height and width analysis of PLL/HA films containing incorporated vesicles. AFM images of a vesicle-containing $(PLL/HA)_{12}/Lip-PLL/HA/PLL/HA$ film were used to calculate the value of height and width of each individual particle. The typical height and width profile is represented in the inset of Figure 2*C* of the main manuscript.

