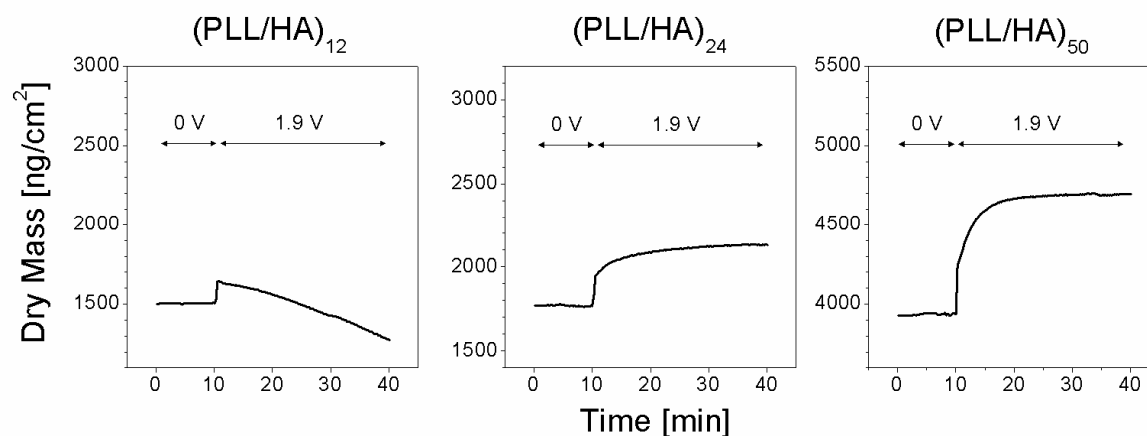
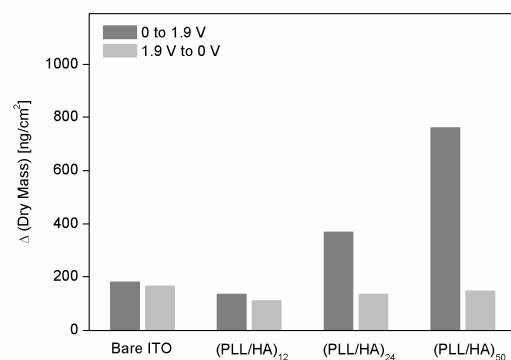


## Supporting Information

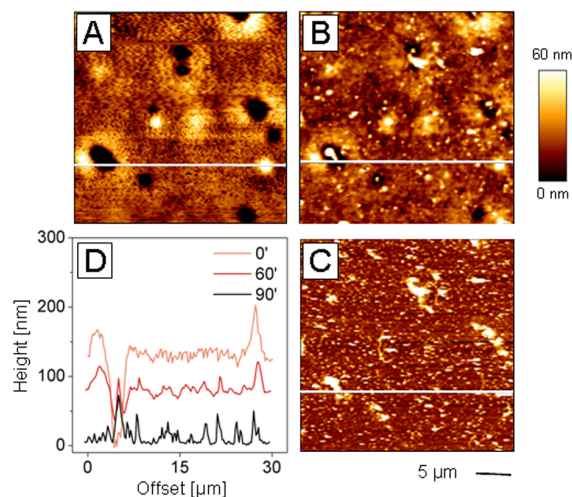


**Figure S1** Initial evolution of the dry mass upon the application of 1.9 V for 12, 24 and 50 bilayers (PLL/HA) films, as measured by ecOWLS. (PLL/HA)<sub>12</sub> film shows a direct decrease in dry mass upon the bias application. (PLL/HA)<sub>24</sub> and (PLL/HA)<sub>50</sub> films show initial signal increase and stabilization..

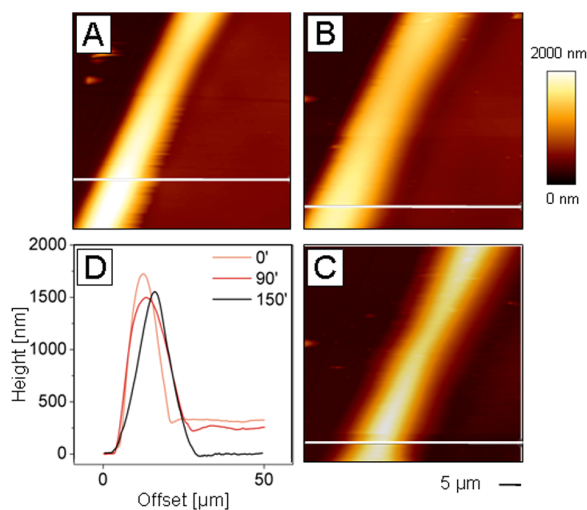


**Figure S2.** ecOWLS signal changes upon potential changes. The dark grey bars represent the signal increase obtained upon a potential switch from 0 to 1.9 V. The light grey bars show the signal decrease corresponding to the potential switch from 1.9 to 0 V. For the bare electrode and (PLL/HA)<sub>12</sub> film, the

signal increase is reversible. However, for (PLL/HA)<sub>24</sub> and (PLL/HA)<sub>50</sub> films, the signal increase is much larger than the signal drop.

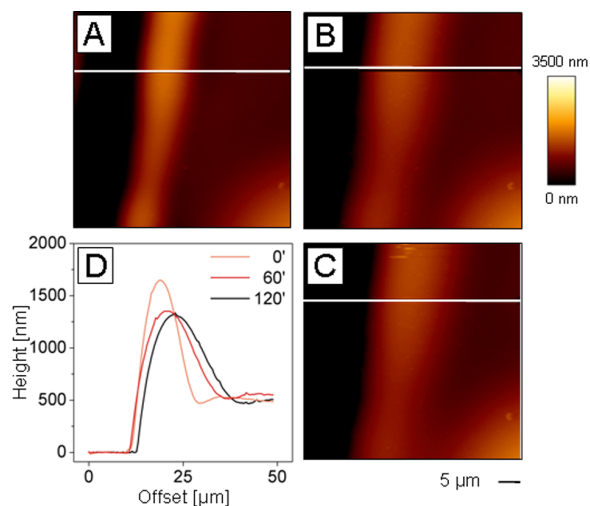


**Figure S3.** Dissolution of (PLL/HA)<sub>12</sub> film as followed by ecAFM. Height mode images show the film initially (*A*) and after 60 (*B*) and 90 (*C*) minutes under an external potential of 1.9 V. Images are 30 x 30 μm<sup>2</sup>. The horizontal white line on each image corresponds to the profiles presented in (*D*). The apparition of aggregates on the film surface upon dissolution can be observed.



**Figure S4.** Dissolution of (PLL/HA)<sub>24</sub> film as followed by ecAFM. 50 x 50 μm<sup>2</sup> height mode images initially (*A*) and after 90 (*B*) and 150 (*C*) minutes under an external potential of 1.9 V show the gradual film dissolution. The horizontal white line on each image corresponds to the profiles presented in (*D*).

The upper left corner corresponds to a scratched area allowing for the determination of the film thickness.



**Figure S5.** (PLL/HA)<sub>50</sub> film upon application of 1.9 V as followed by ecAFM. The 50 x 50 μm<sup>2</sup> height mode images initially (A) and after 60 (B) and 120 (C) minutes show no changes in film thickness upon bias application. The horizontal white line on each image corresponds to the profiles presented in (D). The black left part corresponds to a scratched area allowing for the determination of the film thickness.