Electronic Supplementary Information (ESI)

Introducing high gravity field to enhance infiltration of small molecules into polyelectrolyte multilayer

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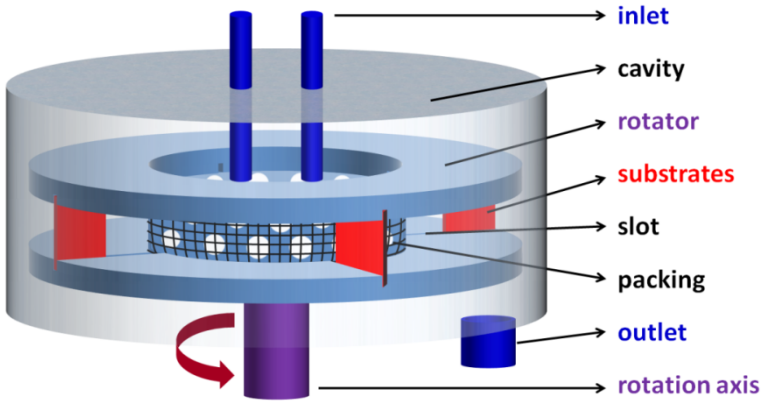
1. Description of the high gravity equipment in detail



Scheme S1. Illustration of the high gravity equipment for LbL assembly.

First proposed in 1979 by Prof. Colin Ramshow from Imperial Chemical Industries, the high gravity field was produced by a rotating packed machine, i. e. high gravity machine, as illustrated in Scheme S1. The high gravity machine mainly consists of a rotator, a packing layer and a cavity. The solution was pumped with a connected commercially available peristaltic pump (not shown) into the machine through inlets. Then the solution flows through a packing layer, which is normally irregular porous packing such as copper or nickel foam surrounding the center axis of the rotator. Close to the packing layer, there are four slots with a width of about 1 mm (the thickness of quartz substrate is also around 1 mm to be inserted into these slots). The substrates inserted in the slots and the packing layer could be driven to rotate by the central rotation axis. The acceleration value could reach up to hundreds or even thousands times of gravity force value. After flowing into the machine through the inlet, the solution flows through the packing layer, during which the solution could be broken and torn into tiny drops or thread at a high rotating speed (such as 2,400 r/min). Subsequently, the well-distributed and highly accelerated solution out of the packing layer rapidly collides onto the fixed substrates, leading to the formation of multilayers on the substrates. Excessive solutions will splash and flow to the cavity, and be collected through the outlet. The collected solution can be reused.

2. UV-visible spectra of DAS aqueous solution

We used UV-visible spectrum to characterize the feature absorption of DAS aqueous solution with a concentration of 0.5 mg/mL and a pH value of 3.8. The result showed that DAS had a strong absorption peak at around 340 nm.

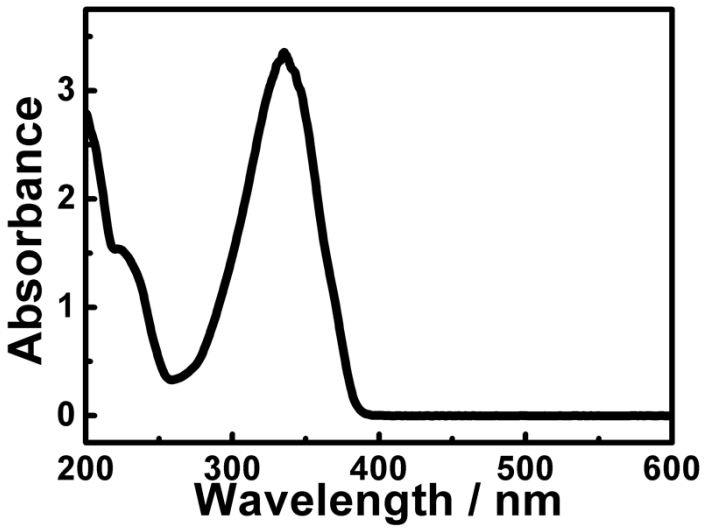


Fig. S1. UV-visible spectrum of DAS aqueous solution.