

Supporting Information

Facile fabrication of robust multilayer films: visible light-triggered chemical cross-linking by the catalysis of ruthenium(II) complex

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1. Content of the residual Ru(II) complex in the x-linked films

The UV-vis spectra were used to evaluate the content of residual Ru(II) complex in films. Fig. S1 shows that the maximum absorption of Ru(II) complex aqueous solution is at 286 nm. Compared with the native films, the absorbance of the x-linked films around 286 nm slightly increased due to the diffusion of Ru(II) complex into the assembled films. After immersing the x-linked films into DI water for about 15 min, however, the difference of absorbance (between the cleaned x-linked and native films) around 286 nm disappeared, see Fig. S1. This result indicates that the residual reagents can be “dialyzed out” easily in a short time, which will minimize the impact of residual reagents on toxicity and function of the films.

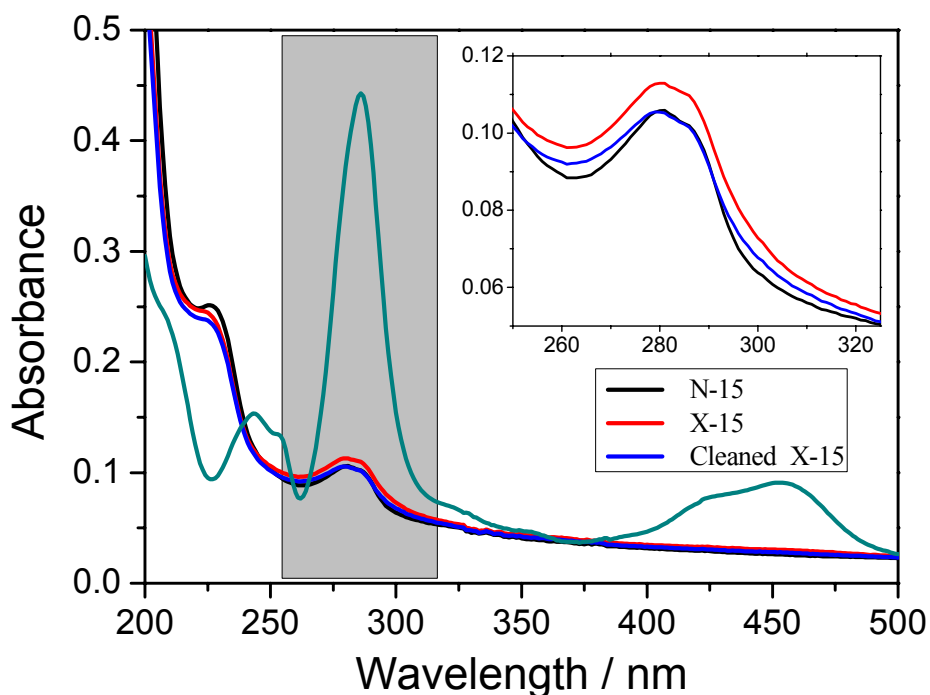


Fig. S1 The UV-vis spectra of native (N-15), x-linked (X-15), cleaned X-15 films and the aqueous solution of Ru(II) complex ($16.7 \mu\text{M}$). To prepare cleaned X-15 films, X-15 films were immersed into DI water for 15 min and rinsed by DI water, followed by air drying. Inset: detailed UV-vis spectra ranging from 250 nm to 325 nm. All film samples contain 15 bilayers of PAAm/PVPh.

2. The difference of corrosion-resistance between the native and x-linked films

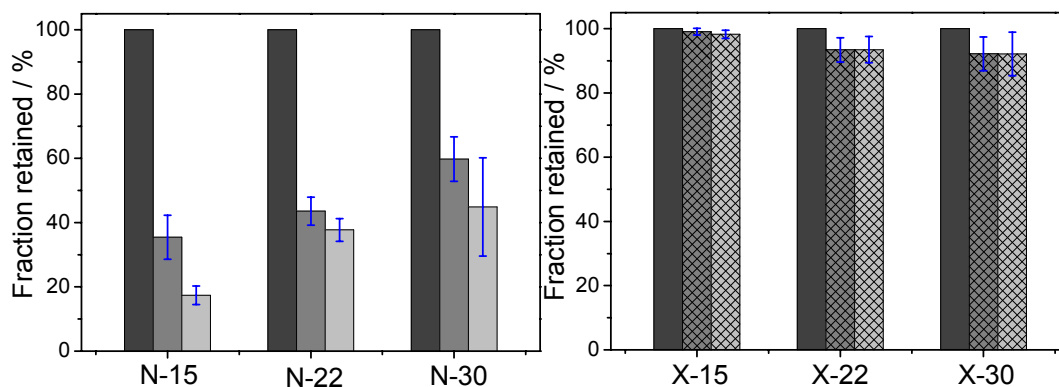


Fig. S2 The fractions retained of native films (N-15, N-22 and N-30) and x-linked films (X-15, X-22 and X-30) after solvent etching. The dark gray, gray and light gray columns represent the films of untreated, treated only with the ternary mixture, and that sequentially treated with ternary mixture and DMF, respectively. All fractions retained were calculated on the basis of the absorbance of the films at 227 nm by UV-vis measurements.

3. Surface morphology of native and x-linked films

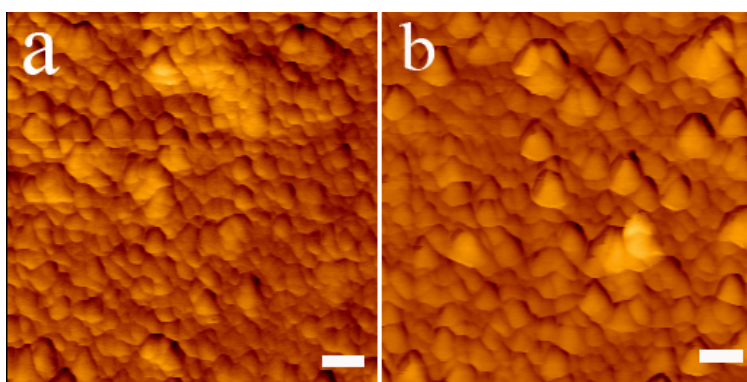


Fig. S3 The AFM height images of the surface morphology of native (a) and x-linked (b) (PAAm/PVPh)₅ multilayer films. The scale bars represent 500 nm.

4. Surface wettability of the films

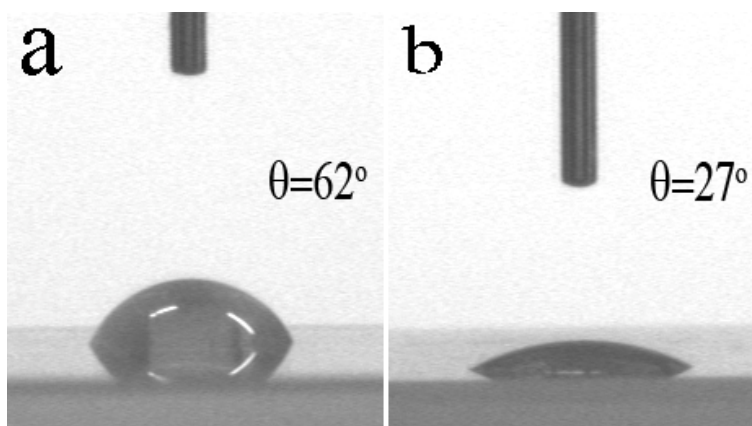


Fig. S4 The static contact angles of native (a) and x-linked (b) (PAAm/PVPh)₅ multilayer films.

5. The full solid-state ^{13}C -NMR spectra of the native (lower curve) and x-linked (upper curve) PAAm/PVPh complexes

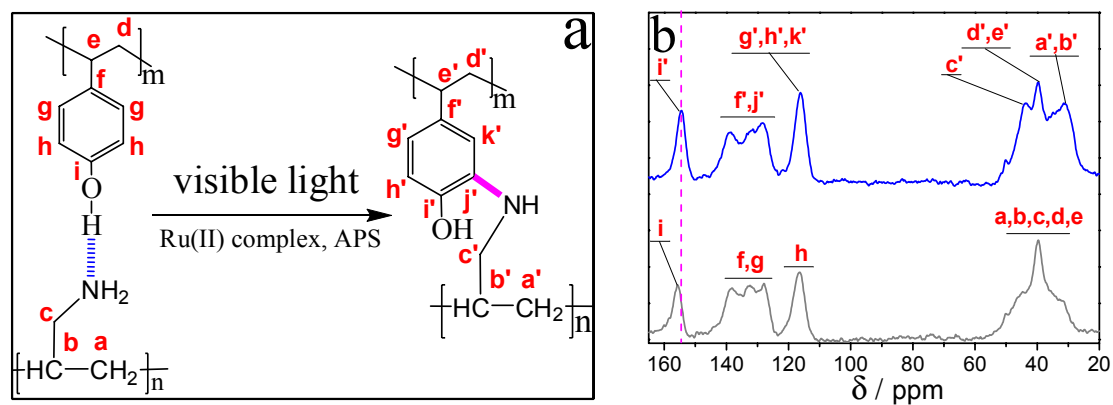


Fig. S5 (a) Reaction of PAAm and PVPh triggered by visible light irradiation. (b) The full solid-state ^{13}C -NMR spectra of the native (lower curve) and x-linked (upper curve) PAAm/PVPh complexes.