

Supplementary Materials: Facile Functionalization of Electrospun Poly(ethylene-co-vinyl alcohol) Nanofibers via the Benzoxaborole-Diol Interaction

Yohei Kotsuchibashi and Mitsuhiro Ebara

1. Preparation of P(MEO₂MA_{91.0}-co-MAAmBO_{9.0})

MEO₂MA (900 mg, 4.78 mmol), MAAmBO (116 mg, 0.53 mmol), 4-cyanopentanoic acid dithiobenzoate (CTP) (7.42 mg, 2.66×10^{-2} mmol) and 4,4'-azobis-4-cyanovaleric acid (ACVA) (2.98 mg, 1.06×10^{-2} mmol) ([MEO₂MA]₀/[MAAmBO]₀/[CTP]₀/[ACVA]₀ = 180/20/1/0.4) were dissolved in 4 mL of methanol. After degassing with nitrogen gas for 30 min, the mixture was allowed to polymerize for 24 h at 60 °C. The resulting P(MEO₂MA-co-MAAmBO) was purified by dialysis against ethanol and acetone and was dried under reduced pressure.

2. Preparation of P(MEO₂MA_{86.7}-co-MAAmBO_{4.8}-co-Ac_{8.5})

MEO₂MA (850 mg, 4.52 mmol), MAAmBO (116 mg, 0.53 mmol), Ac (19 mg, 0.27 mmol), 4-cyanopentanoic acid dithiobenzoate (CTP) (7.42 mg, 2.66×10^{-2} mmol) and 4,4'-azobis-4-cyanovaleric acid (ACVA) (2.98 mg, 1.06×10^{-2} mmol) ([MEO₂MA]₀/[MAAmBO]₀/[Ac]₀/[CTP]₀/[ACVA]₀ = 170/20/10/1/0.4) were dissolved in 4 mL of methanol. After degassing with nitrogen gas for 30 min, the mixture was allowed to polymerize for 24 h at 60 °C. The P(MEO₂MA_{86.7}-co-MAAmBO_{4.8}-co-Ac_{8.5}) was purified by the same protocol as shown above.

3. Preparation of P(MEO₂MA_{93.9}-co-MAAmBO_{5.2}-co-PyMA_{0.9})

MEO₂MA (900 mg, 4.78 mmol), MAAmBO (116 mg, 0.53 mmol), PyMA (16 mg, 5.31×10^{-2} mmol), 4-cyanopentanoic acid dithiobenzoate (CTP) (7.42 mg, 2.66×10^{-2} mmol) and 4,4'-azobis-4-cyanovaleric acid (ACVA) (2.98 mg, 1.06×10^{-2} mmol) ([MEO₂MA]₀/[MAAmBO]₀/[PyMA]₀/[CTP]₀/[ACVA]₀ = 178/20/2/1/0.4) were dissolved in 4 mL of methanol. After degassing with nitrogen gas for 30 min, the mixture was allowed to polymerize for 24 h at 60 °C. The P(MEO₂MA_{93.9}-co-MAAmBO_{5.2}-co-PyMA_{0.9}) was purified by the same protocol as shown above.

4. Preparation of P(MEO₂MA_{99.0}-co-PyMA_{1.0})

MEO₂MA (990 mg, 5.26 mmol), PyMA (16 mg, 5.31×10^{-2} mmol), 4-cyanopentanoic acid dithiobenzoate (CTP) (7.42 mg, 2.66×10^{-2} mmol) and 4,4'-azobis-4-cyanovaleric acid (ACVA) (2.98 mg, 1.06×10^{-2} mmol) ([MEO₂MA]₀/[PyMA]₀/[CTP]₀/[ACVA]₀ = 198/2/1/0.4) were dissolved in 4 mL of methanol. After degassing with nitrogen gas for 30 min, the mixture was allowed to polymerize for 24 h at 60 °C. The P(MEO₂MA_{99.0}-co-PyMA_{1.0}) was purified by the same protocol as shown above.

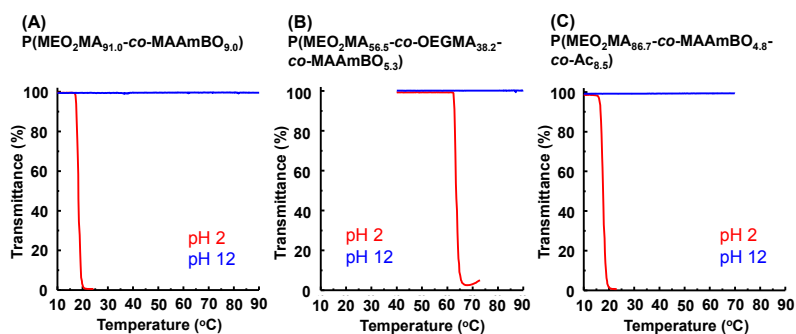


Figure S1. Transmittance changes of 0.1 wt % (A) P(MEO₂MA_{91.0}-co-MAAmBO_{9.0}), (B) P(MEO₂MA_{56.5}-co-OEGMA_{38.2}-co-MAAmBO_{5.3}) and (C) P(MEO₂MA_{86.7}-co-MAAmBO_{4.8}-co-Ac_{8.5}) at pH 2 (red line) and 12 (blue line) as a function of temperature.

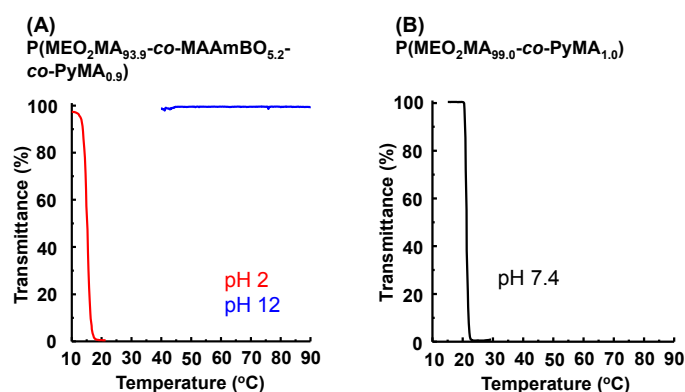


Figure S2. (A) Transmittance changes of 0.1 wt % P(MEO₂MA_{93.9}-co-MAAmBO_{5.2}-co-PyMA_{0.9}) at pH 2 (red line) and 12 (blue line) as a function of temperature. (B) Transmittance changes of 0.1 wt % P(MEO₂MA_{99.0}-co-PyMA_{1.0}) at pH 7.4 PBS as a function of temperature.

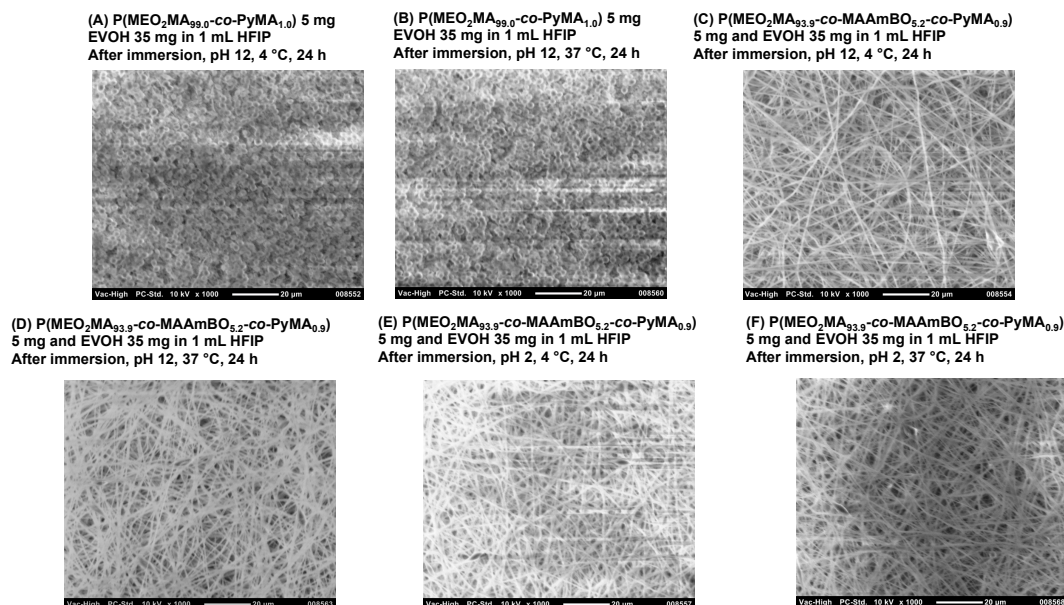


Figure S3. SEM images of electro-spinning samples after immersion for 24 h at various conditions: (A) P(MEO₂MA_{99.0}-co-PyMA_{1.0})/EVOH, pH 12, 4 °C; (B) P(MEO₂MA_{99.0}-co-PyMA_{1.0})/EVOH, pH 12, 37 °C; (C) P(MEO₂MA_{93.9}-co-MAAmBO_{5.2}-co-PyMA_{0.9})/EVOH, pH 12, 4 °C; (D) P(MEO₂MA_{93.9}-co-MAAmBO_{5.2}-co-PyMA_{0.9})/EVOH, pH 12, 37 °C; (E) P(MEO₂MA_{93.9}-co-MAAmBO_{5.2}-co-PyMA_{0.9})/EVOH, pH 2, 4 °C; and (F) P(MEO₂MA_{93.9}-co-MAAmBO_{5.2}-co-PyMA_{0.9})/EVOH, pH 2, 37 °C.

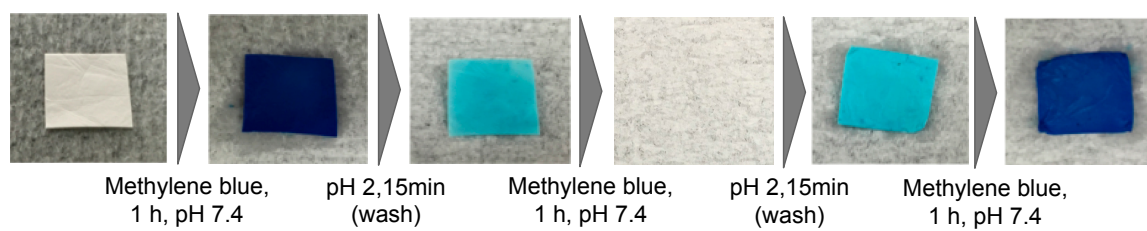


Figure S4. Reusability test of EVOH/P(MEO2MA86.7-co-MAAmBO4.8-co-Ac8.5) nanofiber on pH-responsive adsorption/desorption of methylene blue dye.



© 2016 by the authors; licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons by Attribution (CC-BY) license (<http://creativecommons.org/licenses/by/4.0/>).