Supporting Information for

Synthesis of Poly(hydroxyurethane)s from Di(trimethylolpropane)

and Their Application to

Quaternary Ammonium Chloride-functionalized Films

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Figure S1 SEC traces of p(DTMPC-C₆) prepared by the polyaddition of di(trimethylolpropane) (DTMPC) and 1,6-diaminohexane (C₆) in DMF at 70 °C with different C₆/DTMPC ratios. The C₆/DTMPC feed ratios are a) 1.0 or b) 1.1. The reaction time is depicted in the figure.
Figure S2 FT-IR spectra of PHUs (p(DTMPC-C\textsubscript{n})) synthesized from DTMPC and diamines with different methylene spaces.

Figure S3 SEC traces of PHUs (p(DTMPC-C\textsubscript{n})) synthesized from DTMPC and diamines with different methylene spaces in DMF at 70 °C for 23 h.
Figure S4 $^1$H NMR spectra of p(DTMPC-$C_n$) in CD$_3$OD. Top: p(DTMPC-$C_3$). Bottom: p(DTMPC-$C_{12}$). The PHUs were synthesized from DTMPC and corresponding diamines with different methylene spaces in DMF at 70 °C for 23 h. The attribution of each signal is depicted in the figures.
Figure S5 FT-IR spectra of chloroacetylated PHUs (p(DTMPC-C_n-Cl)) PHUs were synthesized from DTMPC and diamines with different methylene spaces and subsequently acetylated.

Figure S6 FT-IR spectra of chloroacetylated PHUs (p(DTMPC-C_n-Cl)) PHUs were synthesized from DTMPC and diamines with different methylene spaces and subsequently acetylated.
Figure S7 ¹H NMR spectra of acetylated PHUs (p(DTMPC-Cₙ-Cl)) in CDCl₃. Top: p(DTMPC-C₃-Cl). Bottom: p(DTMPC-C₁₂-Cl). The PHUs were synthesized from DTMPC and corresponding diamines with different methylene spaces and acetylated. The attribution of each signal is depicted in the figures.
Figure S8 FT-IR spectra of QAC-functionalized PHUs (p(DTMP-C\textsubscript{n}-DMOA-Cl)). PHUs were synthesized from DTMPC and diamines with different methylene spaces and subsequently acetylated followed by quaternized with DMOA.
Figure S9 $^1$H NMR spectra of QAC-functionalized PHUs (p(DTMPC-C$_n$-DMOA-Cl)) in CD$_3$OD. Top: p(DTMPC-C$_3$-DMOA-Cl). Bottom: p(DTMPC-C$_{12}$-DMOA-Cl). The PHUs were synthesized from DTMPC and corresponding diamines with different methylene spaces and acetylated. The attribution of each signal is depicted in the figures. For p(DTMPC-C$_{12}$-DMOA-Cl), the attribution of the both chain ends is omitted for clarity.
**Figure S10** Absorption spectra of QAC-functionalized PHU films (QAC-Films) prepared by the reaction of p(DTMPC-C₆-Cl) with different amounts of TMDAH. TMDAH were 10 (red line), 20 (blue line), 30 (green line), 40 (orange line) or 50 mol% (purple line) with respect to chloroacetyl groups of PHU unit. At vertical axis, absorbance was converted to transmittance.

**Figure S11** Photographs of QAC-functionalized PHU films (QAC-Films) prepared by the reaction of p(DTMPC-C₆-Cl) with different amounts of TMDAH. TMDAH were a) 40 or b) 50 mol% with respect to chloroacetyl groups of PHU unit.
Figure S12 TGA profiles of QAC-Film (blue broken line) or QAC2-Film (red solid line). The QAC-Film was prepared from p(DTMPC-C₆-Cl) with 20 mol% of TMDAH and subsequently modified with DMOA to yield QAC2-Film.

Figure S13 FT-IR spectra of QAC-Film (top) or QAC2-Film (bottom). The QAC-Film was prepared from p(DTMPC-C₆-Cl) with 20 mol% of TMDAH and subsequently modified with DMOA to yield QAC2-Film.