Supporting Information

Water-based eco-friendly fabrication of physicochemically crosslinked and highly wettable PU-rich electrospun PU/PEO nanofiber composites with exceptional chemical and thermal stability

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Table S1. Parameters applied for optimizing PU_x/s-PEO_y/CL_z/bc-NFs blend nanofibers.

Sample code	Polymer solution conditions			Electrospinning conditions		
	PU	PEO	CL	Applied voltage (kV)	TCD (cm)	Solution feeding (mm/sec)
PU_{10}/s-PEO_0/CL_1/bc-NFs	10	0	1	-	-	-
PU_9/s-PEO_1/$CL_{0.9}$/bc-NFs	9	1	0.9	8	8	0.0022
PU_8/s-PEO_2/$CL_{0.8}$/bc-NFs	8	2	0.8	8	10	0.0018
PU_7/s-PEO_3/$CL_{0.7}$/bc-NFs	7	3	0.7	8	10	0.0016
PU_6/s-PEO_4/$CL_{0.6}$/bc-NFs	6	4	0.6	8.5	12	0.0015
PU_5/s-PEO_5/$CL_{0.5}$/bc-NFs	5	5	0.5	8.5	12	0.0014
PU_4/s-PEO_6/$CL_{0.4}$/bc-NFs	4	6	0.4	8.5	12	0.0013
PU_3/s-PEO_7/$CL_{0.3}$/bc-NFs	**3**	**7**	**0.3**	**8.5**	**13**	**0.0010**
PU_2/s-PEO_8/$CL_{0.2}$/bc-NFs	**2**	**8**	**0.2**	**8.5**	**13**	**0.0006**
PU_1/s-PEO_9/$CL_{0.1}$/bc-NFs	1	9	0.1	8.5	12	0.0004
PU_0/s-PEO_{10}/CL_0/bc-NFs	0	10	0	9	12	0.0002

PU aqueous dispersion 30 wt%; PEO aqueous solution 6 wt%, CL- crosslinker 41.3 wt% aqueous solution

Table S2. Parameters applied for optimizing PU_x/8-PEO_y/CL_z/bc-NFs blend nanofibers.

Sample code	Polymer solution conditions			Electrospinning conditions		
	PU	PEO	CL	Applied voltage (kV)	TCD (cm)	Solution feeding (mm/sec)
PU_{10}/8-PEO_0/CL_1/bc-NFs	10	0	1	-	-	-
PU_9/8-PEO_1/$CL_{0.9}$/bc-NFs	9	1	0.9	8	8	0.0022
PU_8/8-PEO_2/$CL_{0.8}$/bc-NFs	8	2	0.8	8	10	0.0018
PU_7/8-PEO_3/$CL_{0.7}$/bc-NFs	7	3	0.7	8	10	0.0016
PU_6/8-PEO_4/$CL_{0.6}$/bc-NFs	**6**	**4**	**0.6**	**8.5**	**12**	**0.0015**
PU_5/8-PEO_5/$CL_{0.5}$/bc-NFs	**5**	**5**	**0.5**	**8.5**	**12**	**0.0014**
PU_4/8-PEO_6/$CL_{0.4}$/bc-NFs	4	6	0.4	8.5	12	0.0013
PU_3/8-PEO_7/$CL_{0.3}$/bc-NFs	3	7	0.3	8.5	13	0.0010
PU_2/8-PEO_8/$CL_{0.2}$/bc-NFs	2	8	0.2	8.5	13	0.0006
PU_1/8-PEO_9/$CL_{0.1}$/bc-NFs	1	9	0.1	8.5	12	0.0004
PU_0/8-PEO_{10}/CL_0/bc-NFs	0	10	0	9	12	0.0002

PU aqueous dispersion 30 wt%; PEO aqueous solution 6 wt%, CL- crosslinker 41.3 wt% aqueous solution

Table S3. Parameters applied for optimizing PU_x/3-PEO_y/CL_z/bc-NFs blend nanofibers.

Sample code	Polymer solution conditions			Electrospinning conditions		
	PU	PEO	CL	Applied voltage (kV)	TCD (cm)	Solution feeding (mm/sec)
PU_{10}/3-PEO_0/CL_1/bc-NFs	10	0	1	-	-	-
PU_9/3-PEO_1/$CL_{0.9}$/bc-NFs	9	1	0.9	8	8	0.0022
PU_8/3-PEO_2/$CL_{0.8}$/bc-NFs	8	2	0.8	8	10	0.0018
PU_7/3-PEO_3/$CL_{0.7}$/bc-NFs	7	3	0.7	8	10	0.0016
PU_6/3-PEO_4/$CL_{0.6}$/bc-NFs	6	4	0.6	8.5	12	0.0015
PU_5/3-PEO_5/$CL_{0.5}$/bc-NFs	5	5	0.5	8.5	12	0.0014
PU_4/3-PEO_6/$CL_{0.4}$/bc-NFs	4	6	0.4	8.5	12	0.0013
PU_3/3-PEO_7/$CL_{0.3}$/bc-NFs	**3**	**7**	**0.3**	**8.5**	**13**	**0.0010**
PU_2/3-PEO_8/$CL_{0.2}$/bc-NFs	**2**	**8**	**0.2**	**8.5**	**13**	**0.0006**
PU_1/3-PEO_9/$CL_{0.1}$/bc-NFs	1	9	0.1	8.5	12	0.0004
PU_0/3-PEO_{10}/CL_0/bc-NFs	0	10	0	9	12	0.0002

PU aqueous dispersion 30 wt%; PEO aqueous solution 6 wt%, CL- crosslinker 41.3 wt% aqueous solution

Table S4. Parameters applied for optimizing PU_x/4-PEO_y/CL_z/bc-NFs blend nanofibers.

Sample code	Polymer solution conditions			Electrospinning conditions		
	PU	PEO	CL	Applied voltage (kV)	TCD (cm)	Solution feeding (mm/sec)
PU_{10}/4-PEO_0/CL_1/bc-NFs	10	0	1	-	-	-
PU_9/4-PEO_1/$CL_{0.9}$/bc-NFs	9	1	0.9	8	8	0.0022
PU_8/4-PEO_2/$CL_{0.8}$/bc-NFs	8	2	0.8	8	10	0.0018
PU_7/4-PEO_3/$CL_{0.7}$/bc-NFs	7	3	0.7	8	10	0.0016
PU_6/4-PEO_4/$CL_{0.6}$/bc-NFs	6	4	0.6	8.5	12	0.0015
PU_5/4-PEO_5/$CL_{0.5}$/bc-NFs	**5**	**5**	**0.5**	**8.5**	**12**	**0.0014**
PU_4/4-PEO_6/$CL_{0.4}$/bc-NFs	**4**	**6**	**0.4**	**8.5**	**12**	**0.0013**
PU_3/4-PEO_7/$CL_{0.3}$/bc-NFs	3	7	0.3	8.5	13	0.0010
PU_2/4-PEO_8/$CL_{0.2}$/bc-NFs	2	8	0.2	8.5	13	0.0006
PU_1/4-PEO_9/$CL_{0.1}$/bc-NFs	1	9	0.1	8.5	12	0.0004
PU_0/4-PEO_{10}/CL_0/bc-NFs	0	10	0	9	12	0.0002

PU aqueous dispersion 30 wt%; PEO aqueous solution 6 wt%, CL- crosslinker 41.3 wt% aqueous solution

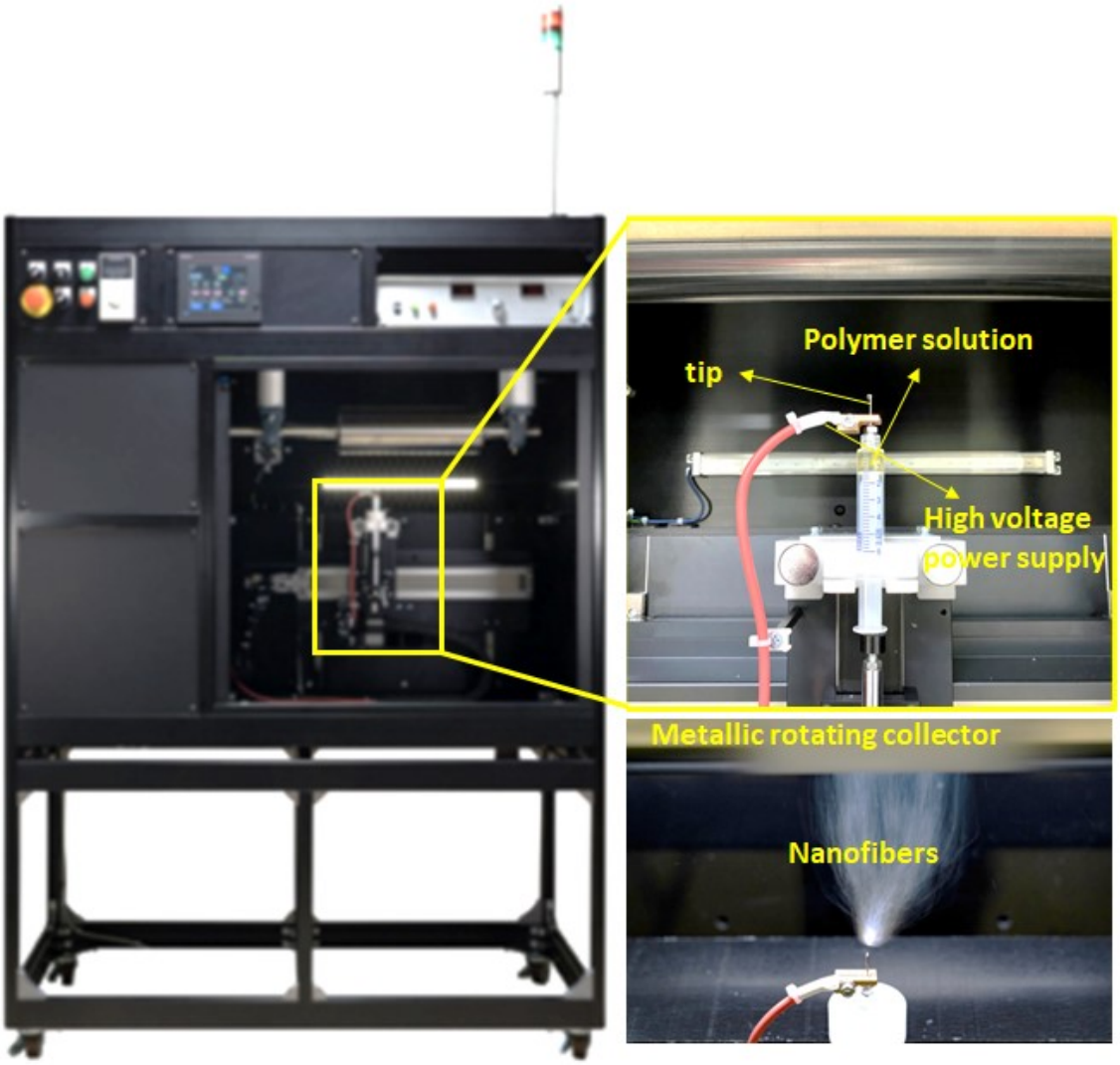

Fig. S1. Electrospinning Setup

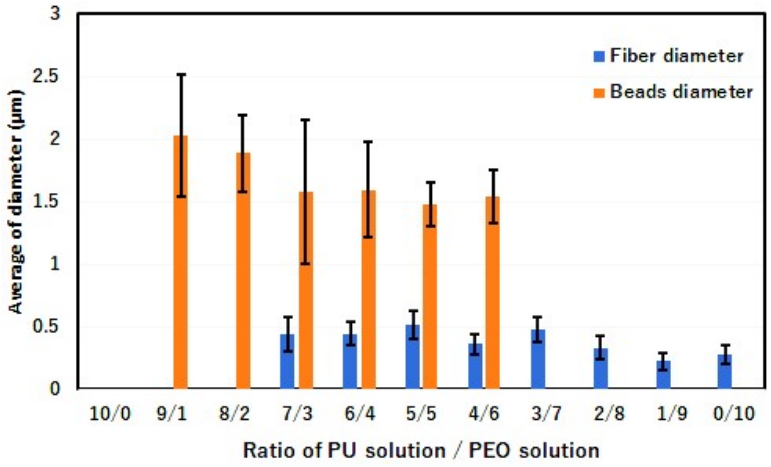

Fig. S2. Average fiber diameter of PU/PEO nanofibers at different PU:PEO mass ratios.

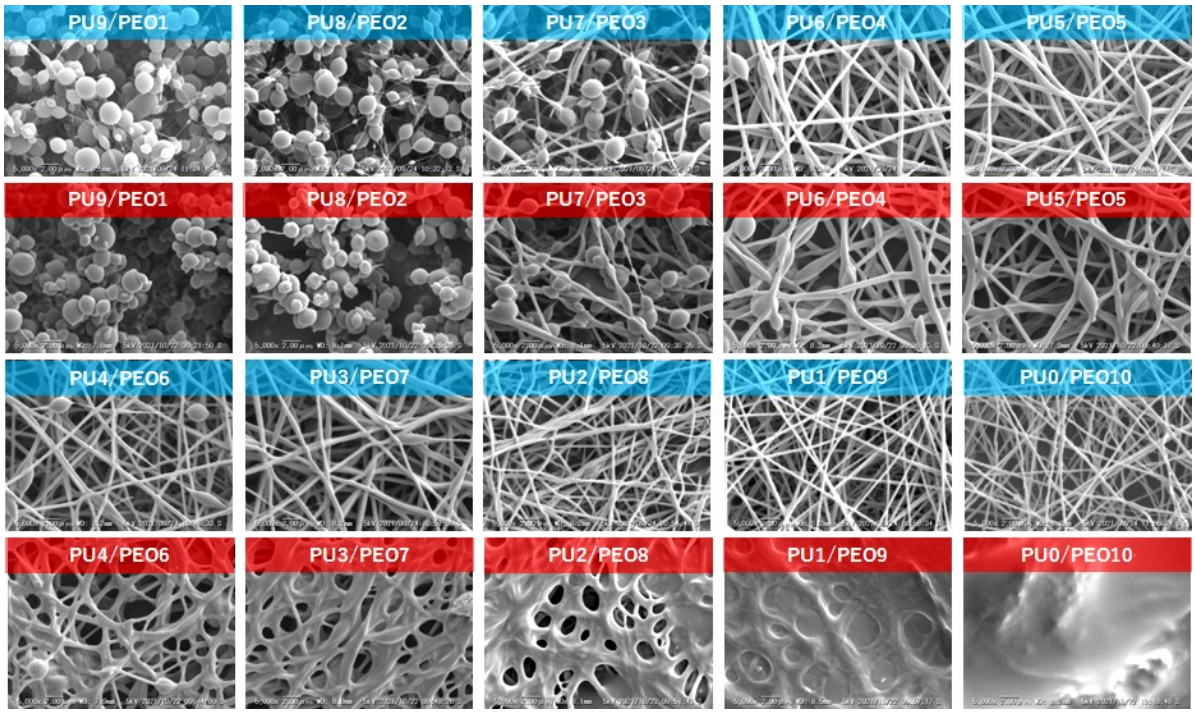

Fig. S3. SEM images of PU_x/s-PEO_y/CL_z nanofibers before and after crosslinking.

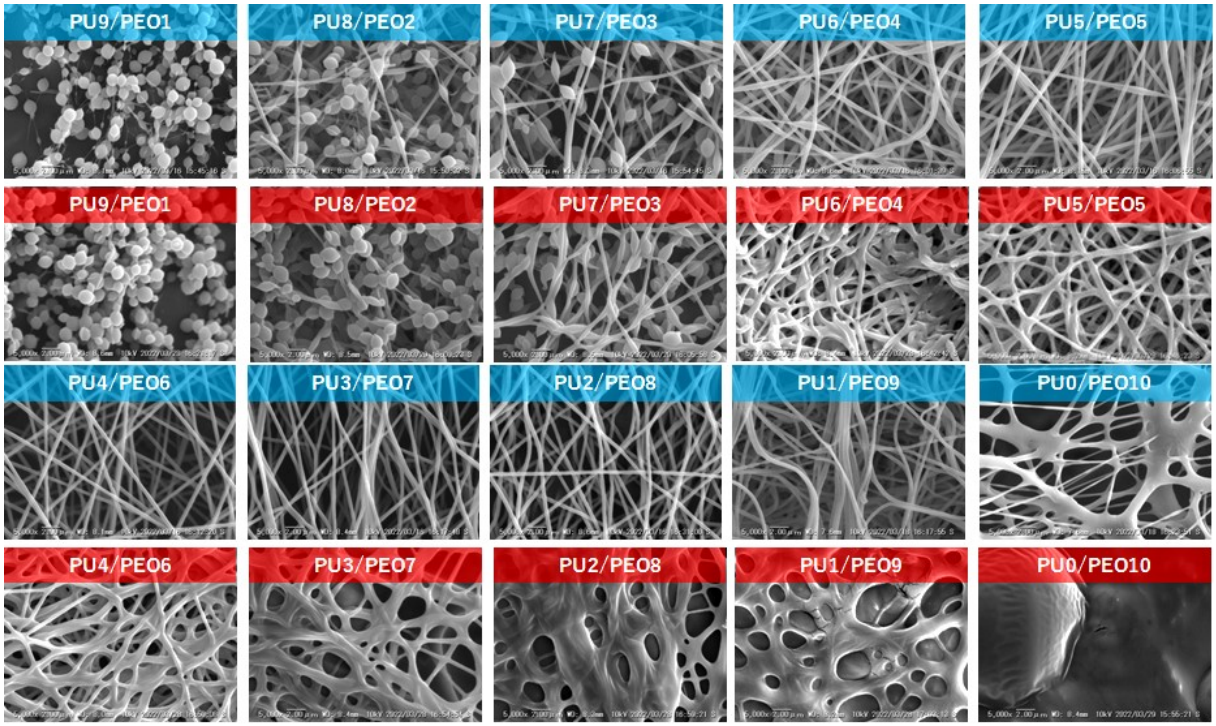

Fig. S4. SEM images of PU_x/4-PEO_y/CL_z nanofibers before and after crosslinking.

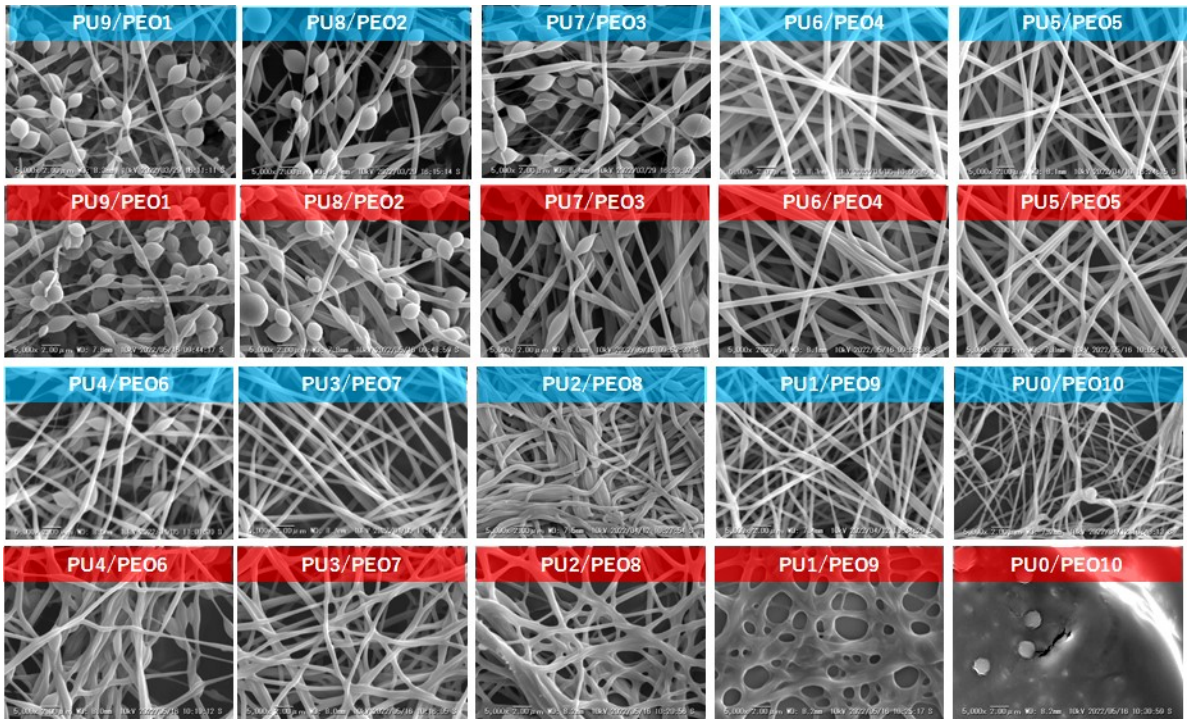

Fig. S5. SEM images of PU_x/8-PEO_y/CL_z nanofibers before and after crosslinking.

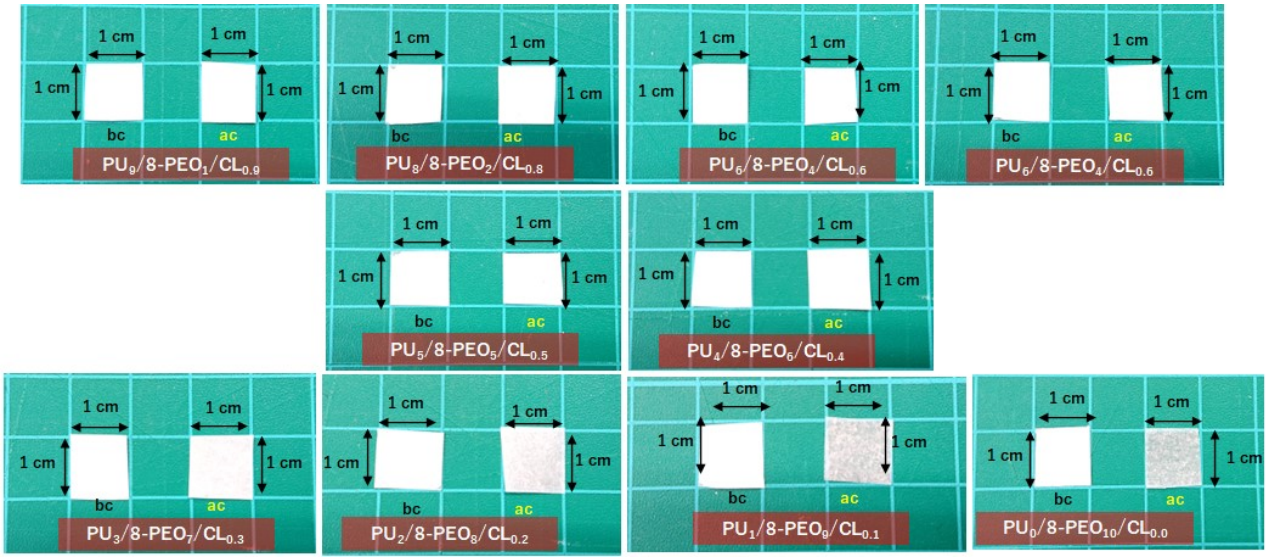

Fig. S6. Physical stability of $PU_x/8\text{-}PEO_y/CL_z$ nanofibers before and after crosslinking.

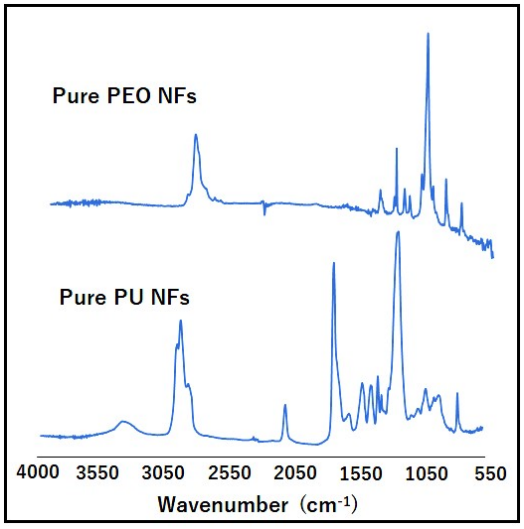

Fig. S7. FT-IR spectra of PEO nanofibers and PU nanofiber composite.

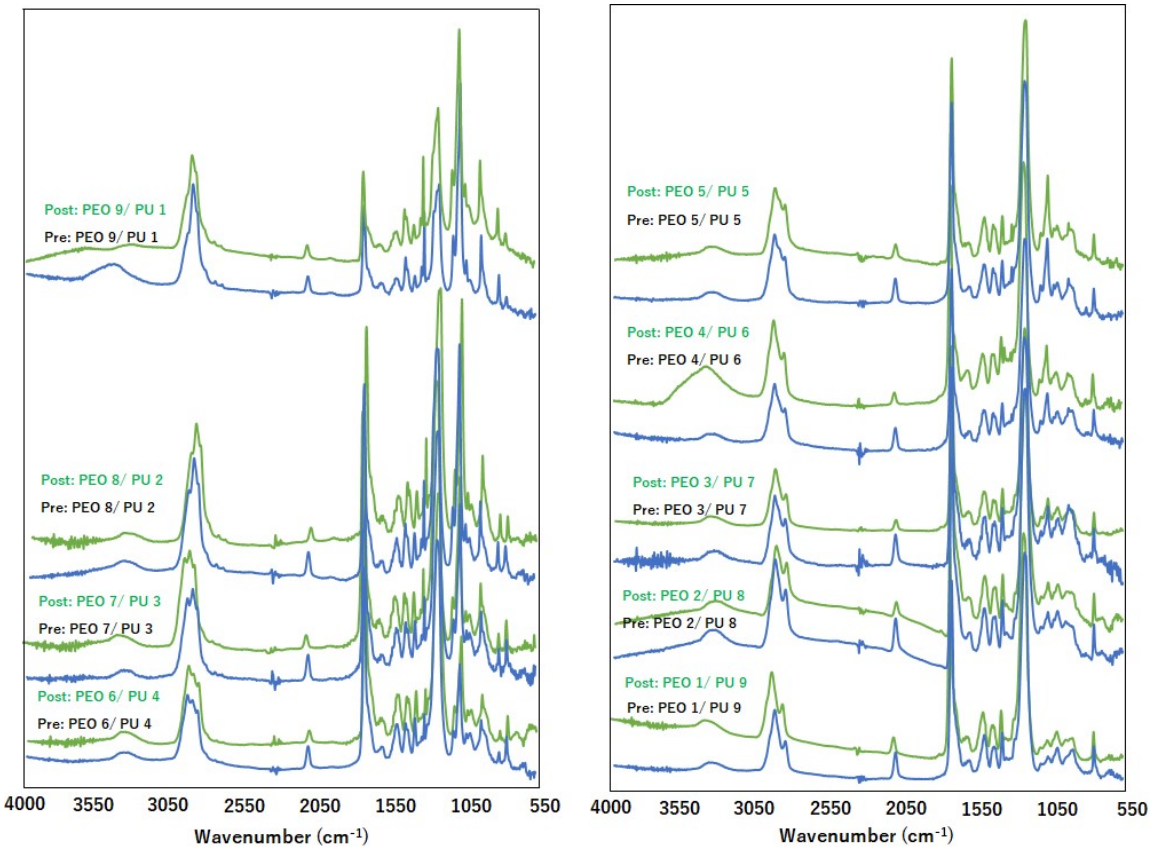

Fig. S8. FT-IR spectra of PU_x/s-PEO_y/CL_z nanofiber composites before and after crosslinking.

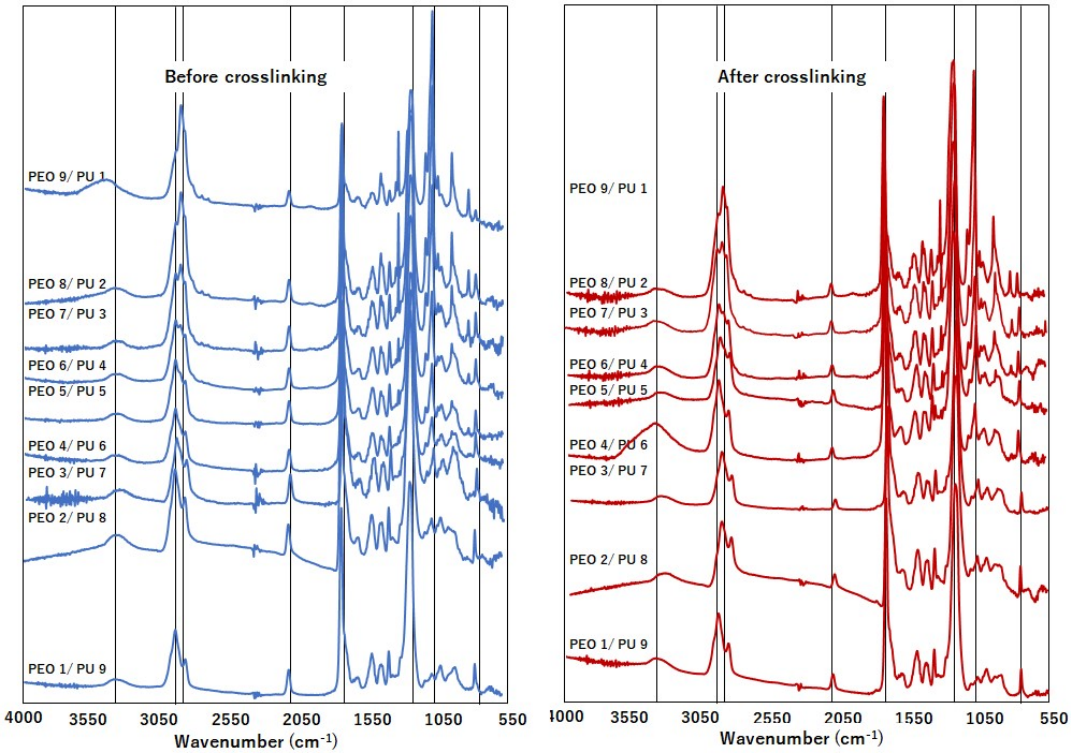

Fig. S9. FT-IR spectra of PU_x/4-PEO_y/CL_z nanofiber composites before and after crosslinking.

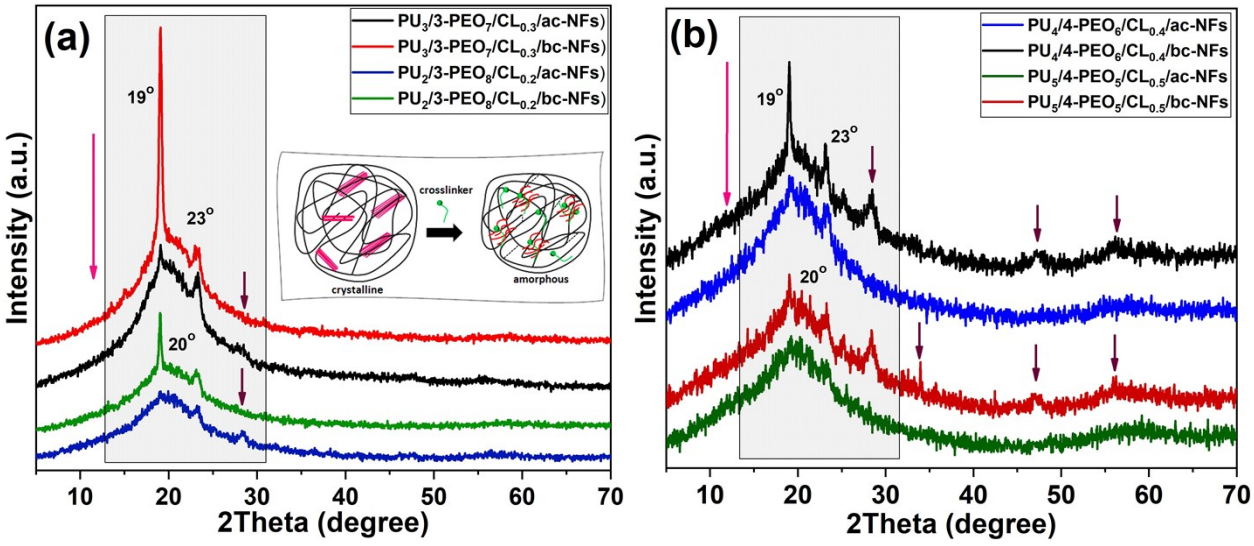

Fig. S10. XRD patterns of (a) PU_x/3-PEO_y/CL_z-bc-NFs and (b) PU_x/4-PEO_y/CL_z-bc-NFs nanofiber composites and before and after thermal crosslinking (PU_x/g-PEO_y/CL_z-ac-NFs).

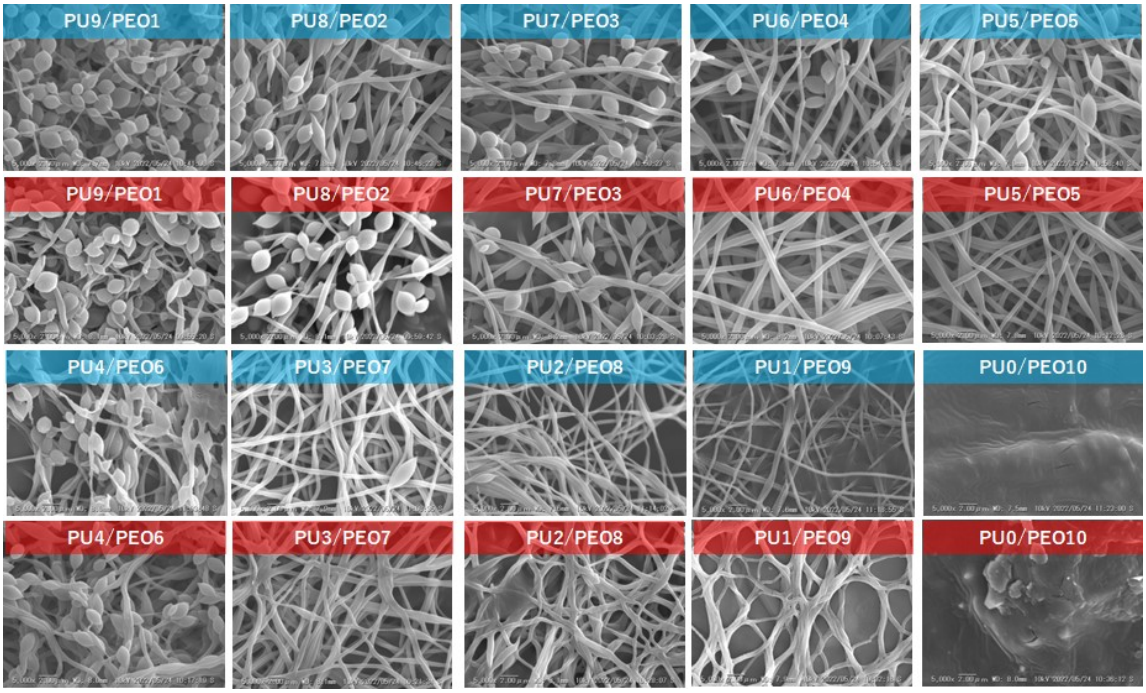

Fig. S11. SEM images of $PU_x/8\text{-}PEO_y/CL_z$ nanofiber composites before and after dipped in hot water at 90°C for 3h (red – crosslinked and blue – non-crosslinked).

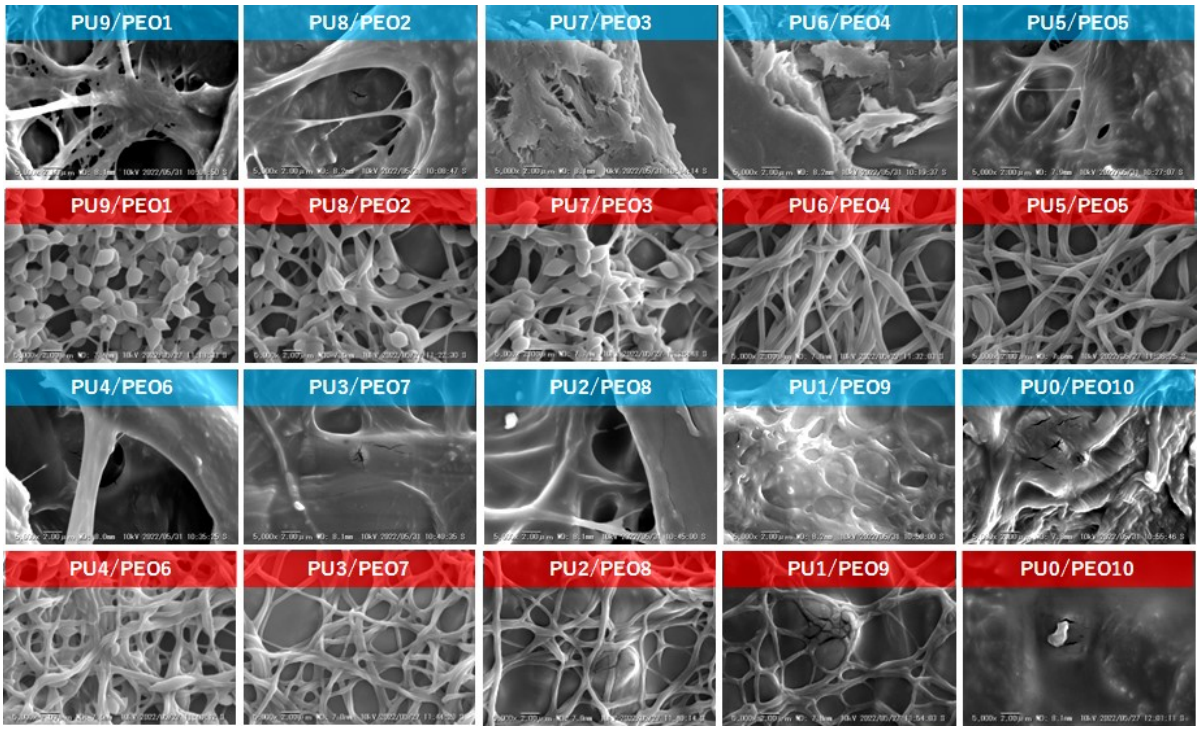

Fig. S12. SEM images of $PU_x/8\text{-}PEO_y/CL_z$ NFs composites before and after dipped in DMF at 60°C for 3h (red – crosslinked and blue – non-crosslinked).

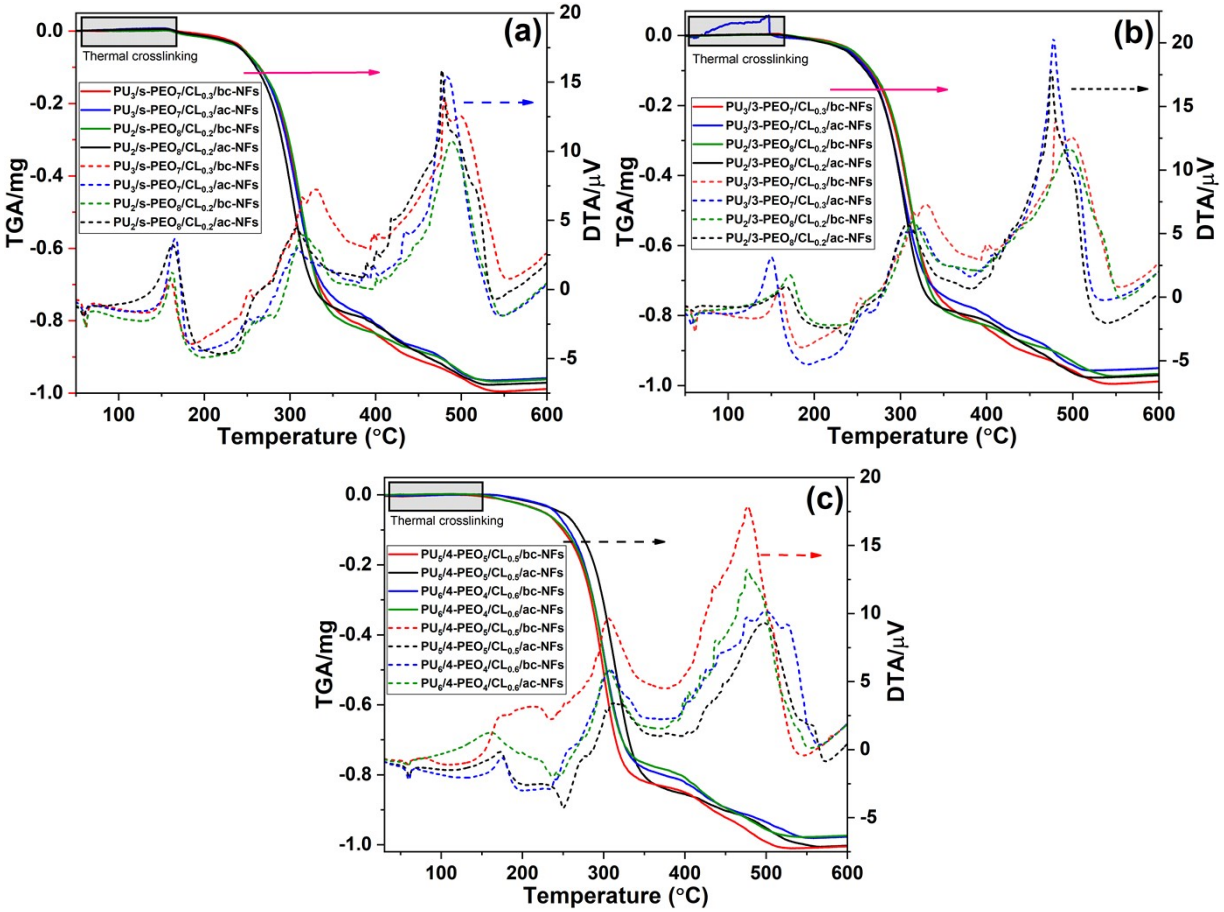

Fig. S13. TG-DTA curves of (a) PU_x/s-PEO_y/CL_z-bc-NFs, (b) PU_x/3-PEO_y/CL_z-bc-NFs and (c) PU_x/4-PEO_y/CL_z-bc-NFs nanofibers composites and the nanofiber composites after crosslinking (PU_x/g-PEO_y/CL_z-ac-NFs).