Figure SI-1. Representative snapshots of PA3 nanofiber at 310 K. While a minor increase in fiber diameter was present, no fiber disintegration was observed.

Figure SI-2. Extended simulation for the RMSD values and number of H-bonds associated with the gradual heating of the PA1 nanofiber (Simulation 1).
**Figure SI-3.** Extended simulation for the RMSD values associated with the PA1 nanofiber heated to 358 K.
Figure SI-4. DSSP of PA1 nanofiber at different temperature values.

Figure SI-5. DSSP of PA2 nanofiber at different temperature values.
Figure SI-6. DSSP of PA3 nanofiber at different temperature values.

Figure SI-7. Number of H-bonds formed between the PA2 molecules as a function of simulation time.
**Figure SI-8.** Plots of the radius of gyration for all nanofibers over the simulation time.