

Supporting Information

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**Bridging gap in thermal conductivity and heat transfer in composite fibers and yarns
via polyimide and silicon nitride composites**

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In this supporting information, we provide SEM micrographs of PI and PISiN nanofibers together with their EDS mapping images and corresponding EDS spectra (Figure S1), SEM micrographs of the cross-section and surface morphology of PI and PISiN yarns (Figure S2), The fiber diameter distribution diagrams of the PI and PISiN nanofibers in the single nozzle and yarn electrospinning processes (Figure S3), the schematic diagram of the setup used for assessing the thermal performance of the electrospun yarns (Figure S4), the thickness of the electrospun yarns (Table S1), and the heat transfer simulation as a function of time (Figure S5).

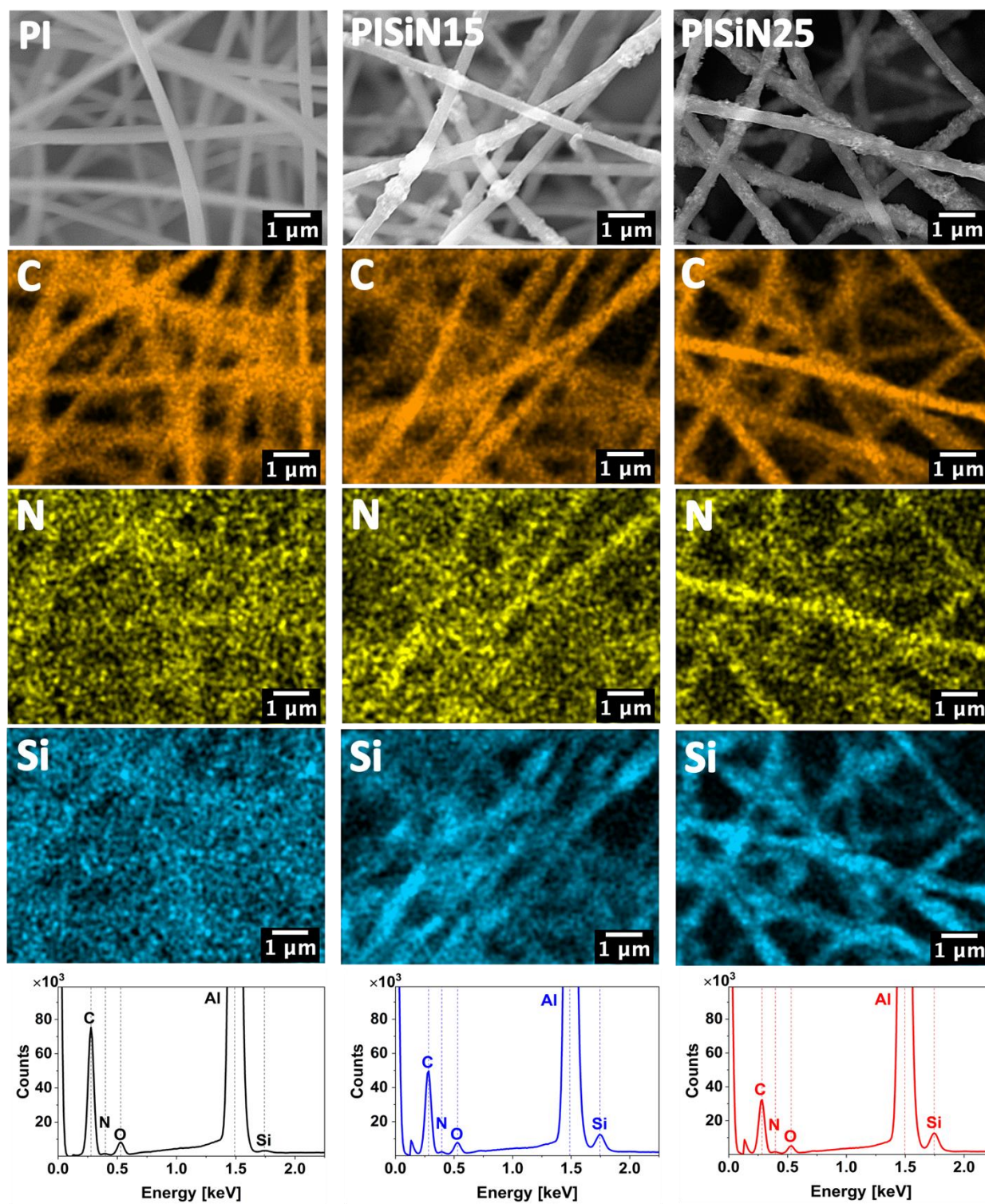


Figure S1. SEM micrographs and EDS mapping images of C, N, and Si elements with corresponding EDS spectrum of electrospun PI, PISiN15, and PISiN25.

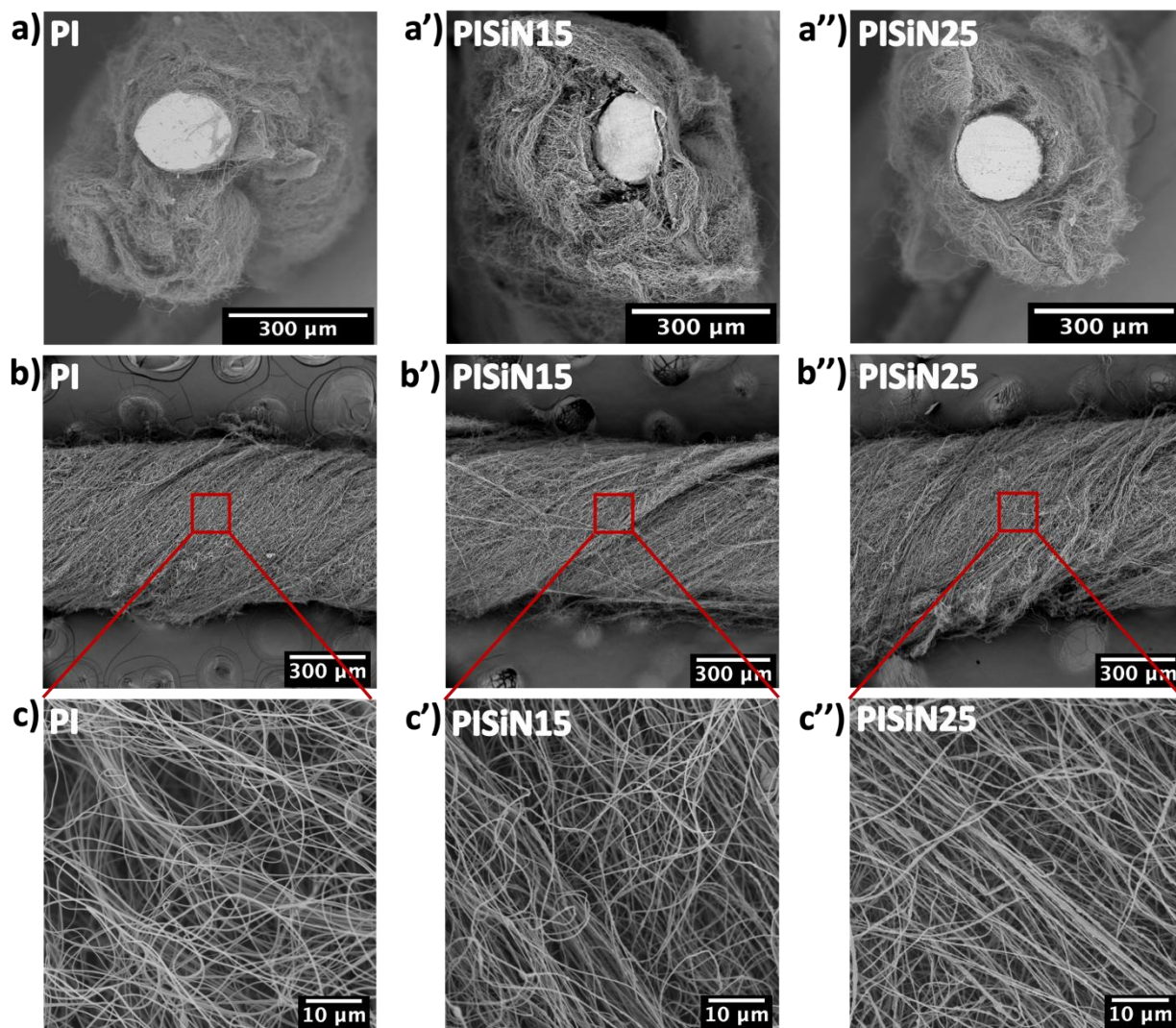


Figure S2. a-a'') SEM micrographs of the cross-sections, b-b'') the surface morphologies, and c-c'') magnified sections of PI, PISiN15, and PISiN25 electrospun yarns

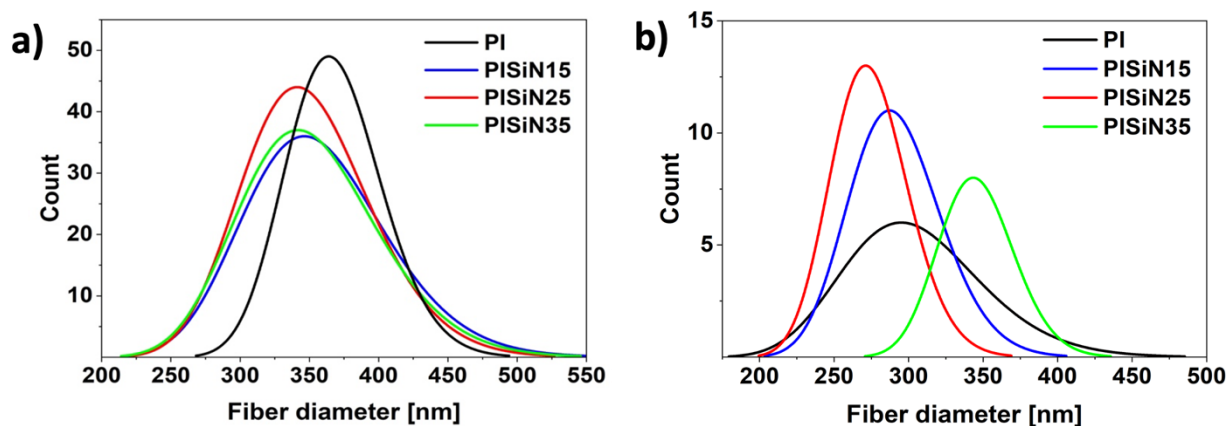


Figure S3. The fiber diameter distribution curves of the electrospun PI and PISiN composite fibers in the a) single nozzle electrospinning and b) yarn electrospinning processes.

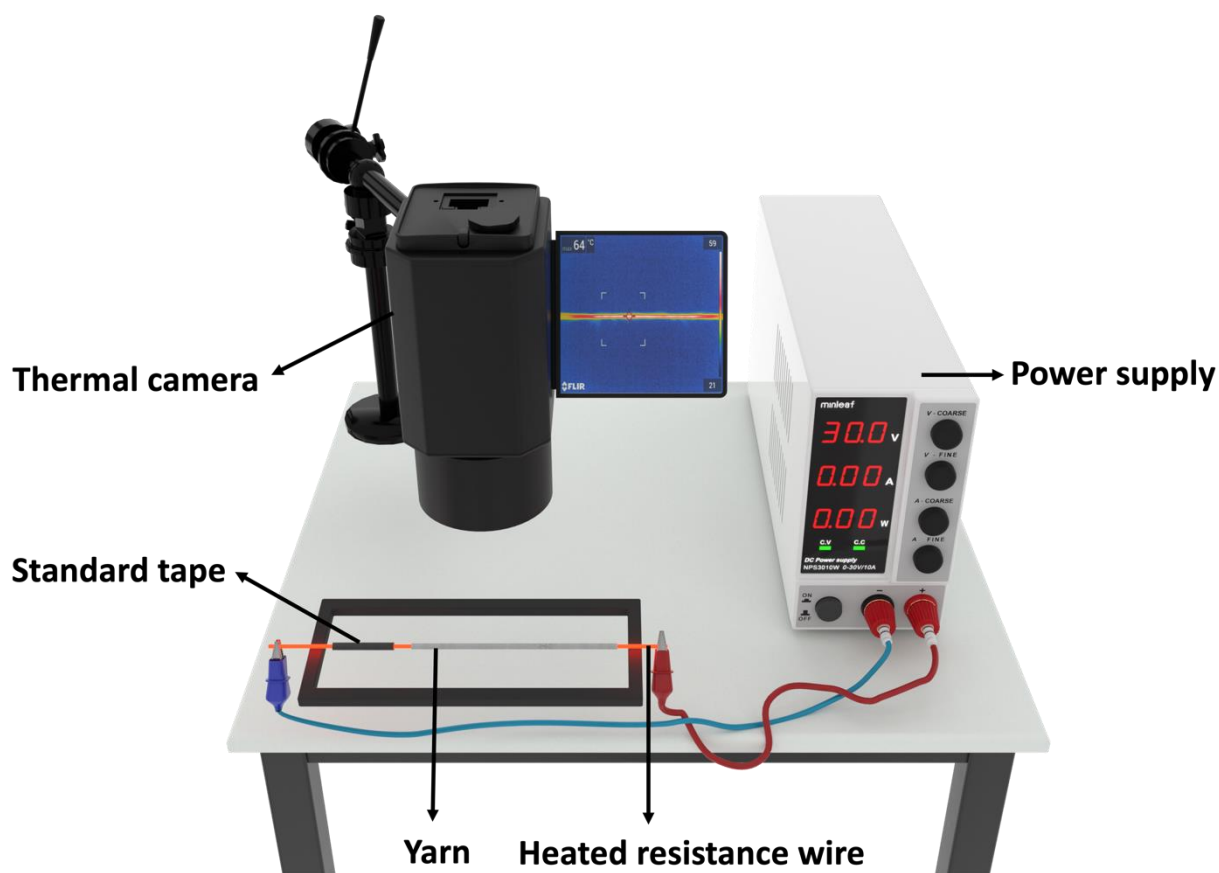


Figure S4. Schematic diagram of the setup used for analyzing the thermal performance of the electrospun yarns

Table S1. The thickness of the PI and PISiN yarns (wire + coating)

	PI	PISiN15	PISiN25	PISiN35
Thickness (μm)	641 ± 7	649 ± 6	772 ± 21	696 ± 11

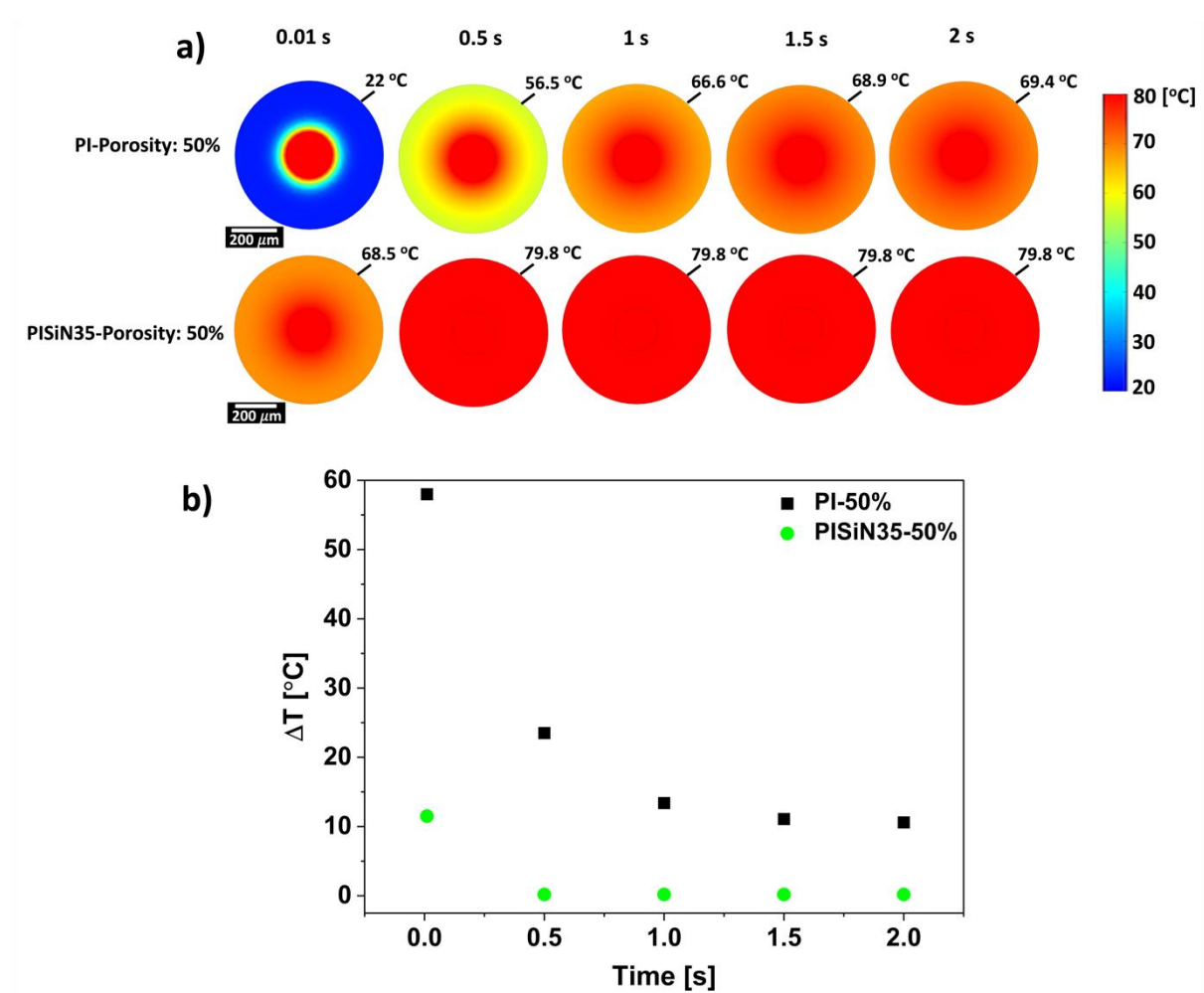


Figure S5. The heat transfer simulation inside the yarns with the polymer coating on the resistance metal wire, a) the temperature distribution in the PI and PISiN35 yarns with 50% porosity in 5 different time steps; b) the temperature difference between the surface of the resistance wire and the yarns as a function of time.