Supporting Information

Bioinspired Hollow Porous Fibers with Low Emissivity and Conductivity Aluminum Platelets Skin for Thermal Insulation

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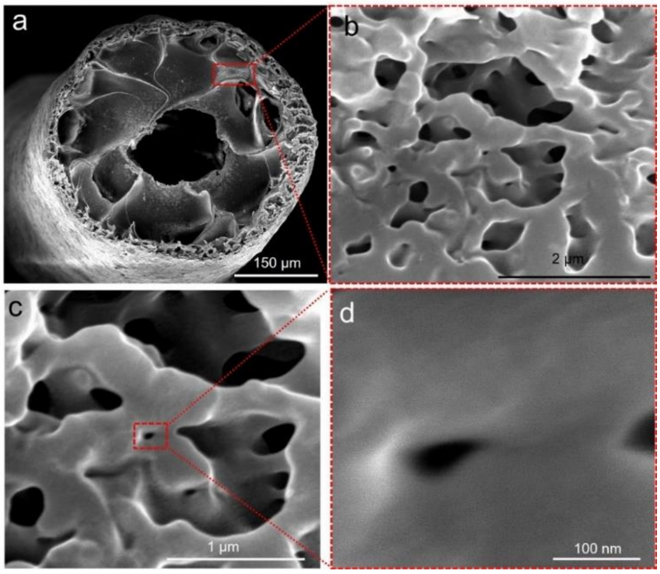

Fig. S1. SEM images of PU/Al HPFs show the micro to nanoscale hierarchical pores and there are some nanometer pores on micrometer ridge.

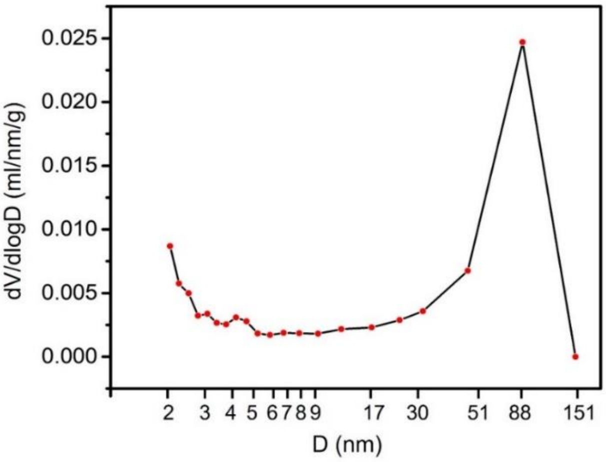

Fig. S2. Pore volume and pore size logarithm curve of PU/Al HPFs show existence of nanometer scale pores (close to 70 nm) in PU/Al HPFs.

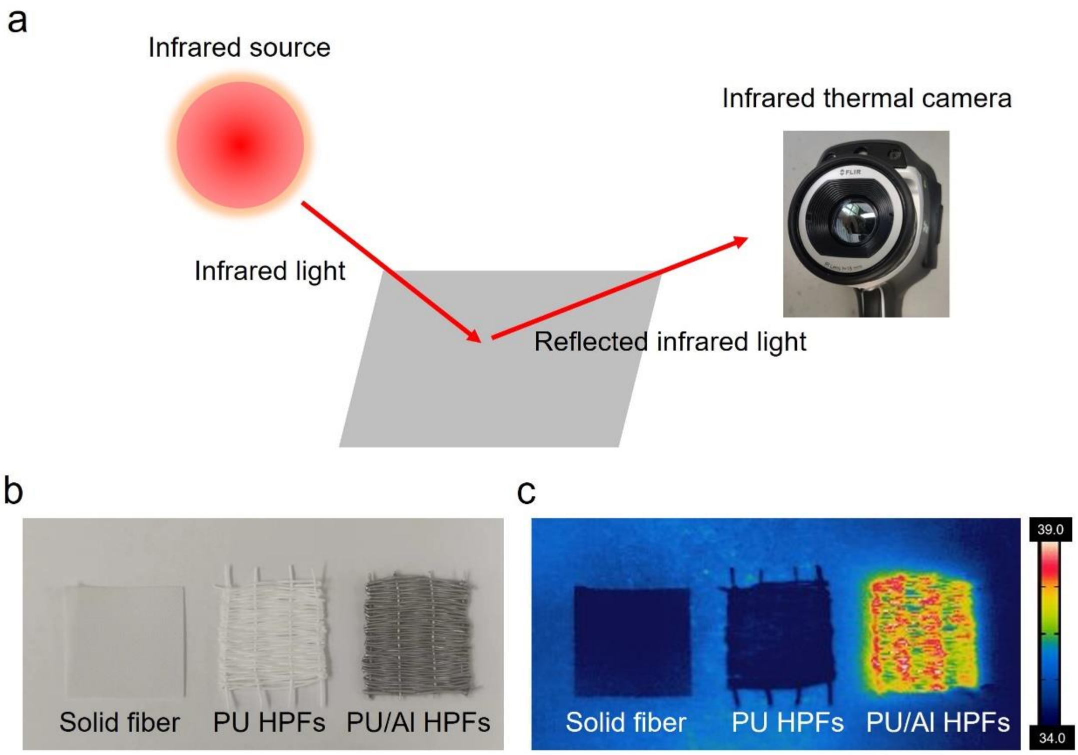

Fig. S3. Infrared (IR) reflection of different fibrous textiles. (a) Schematic illustration of the IR reflection property of fibrous textile through IR thermal camera. (b, c) Photograph and IR thermal image of different fibrous textiles under IR source. PU/Al HPFs textile presents obviously IR reflective property than cotton and PU HPFs textile.

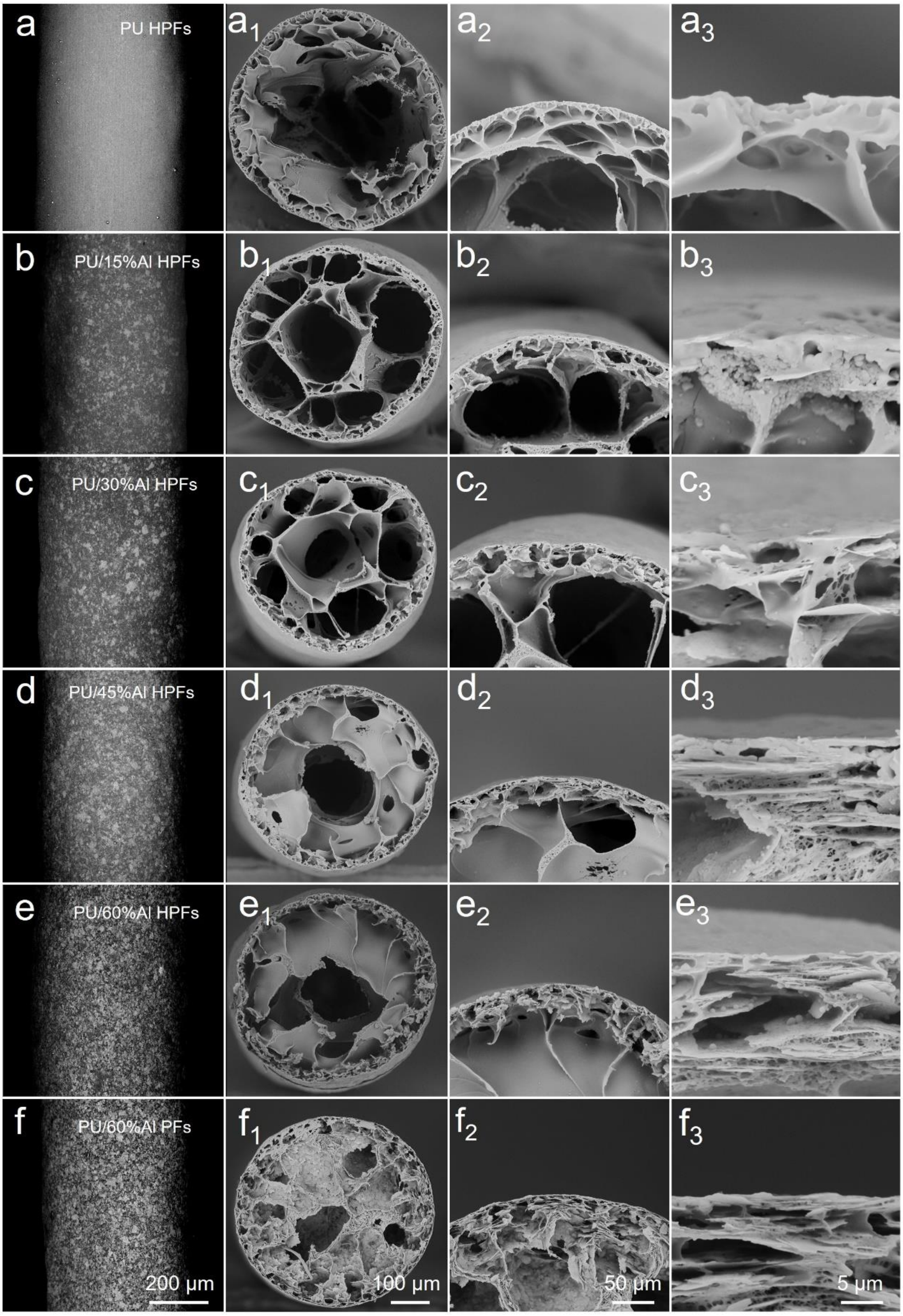

Fig. S4. The SEM image of surface morphology and longitudinal section of PU HPFs, PU/15%Al HPFs, PU/30%Al HPFs, PU/45%Al HPFs, PU/60%Al HPFs and PU/60%Al PFs.

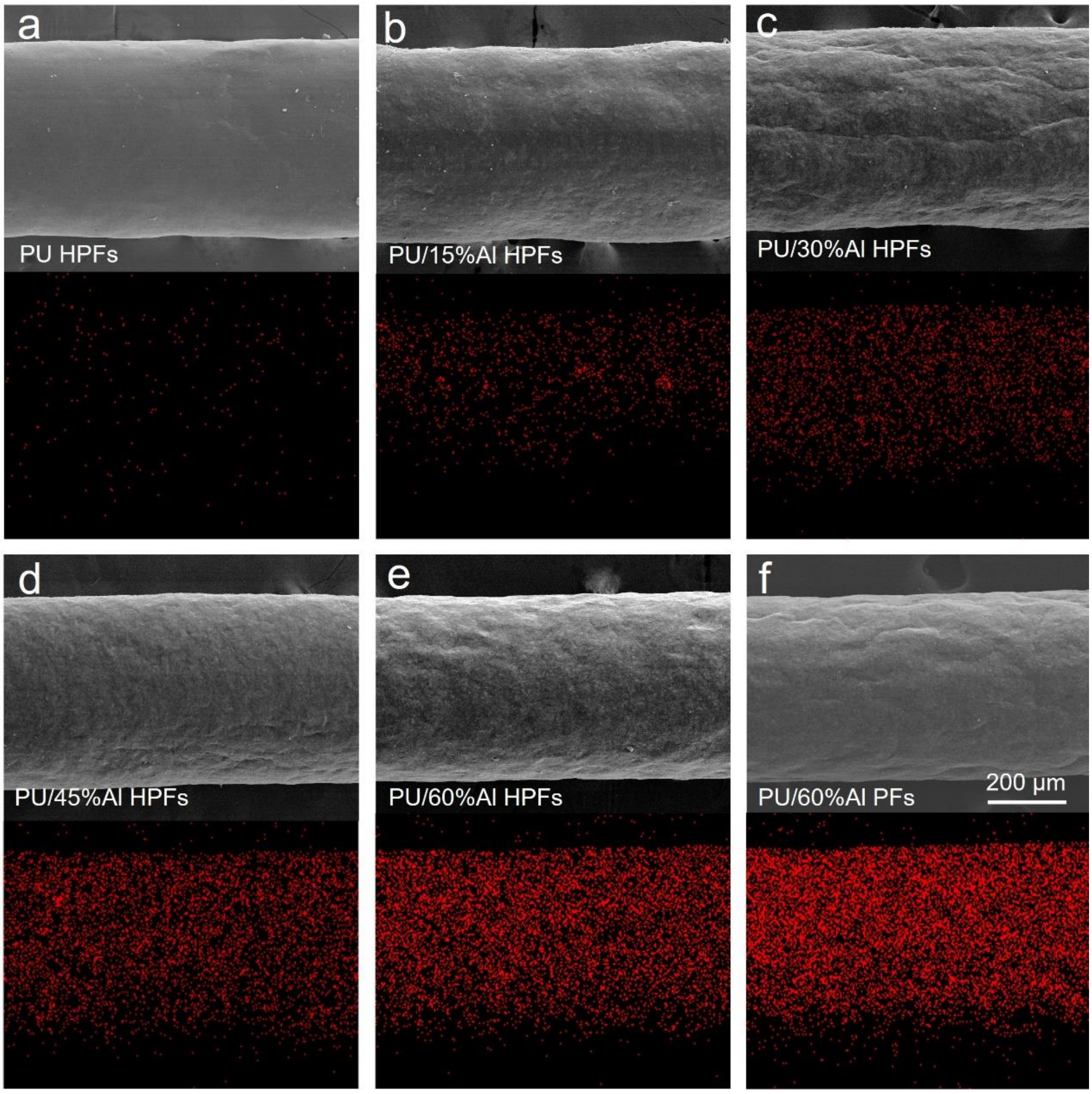

Fig. S5. (a-f) SEM image and EDS elemental maps show increasing Al element content distribute uniformly in the sheath of the fibers with the increasing Al platelets content.

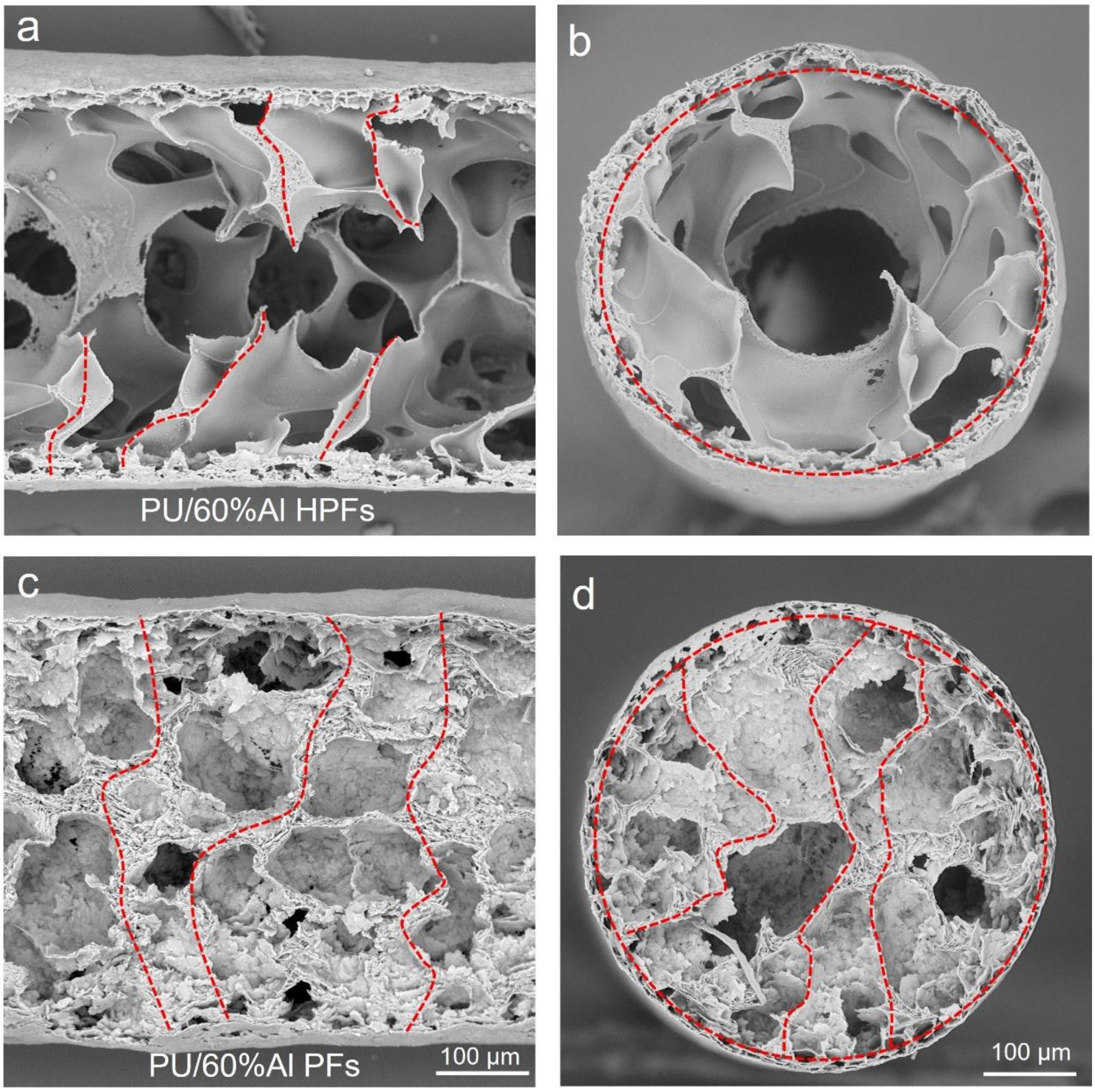

Fig. S6. The heat transfer channels of PU/60%Al HPFs and PU/60%Al PFs. (a, b) SEM image of section of PU/60%Al HPFs show its limited heat transfer channels. (c, d) SEM image of section of PU/60%Al PFs show more heat transfer channels than PU/60%Al HPFs.

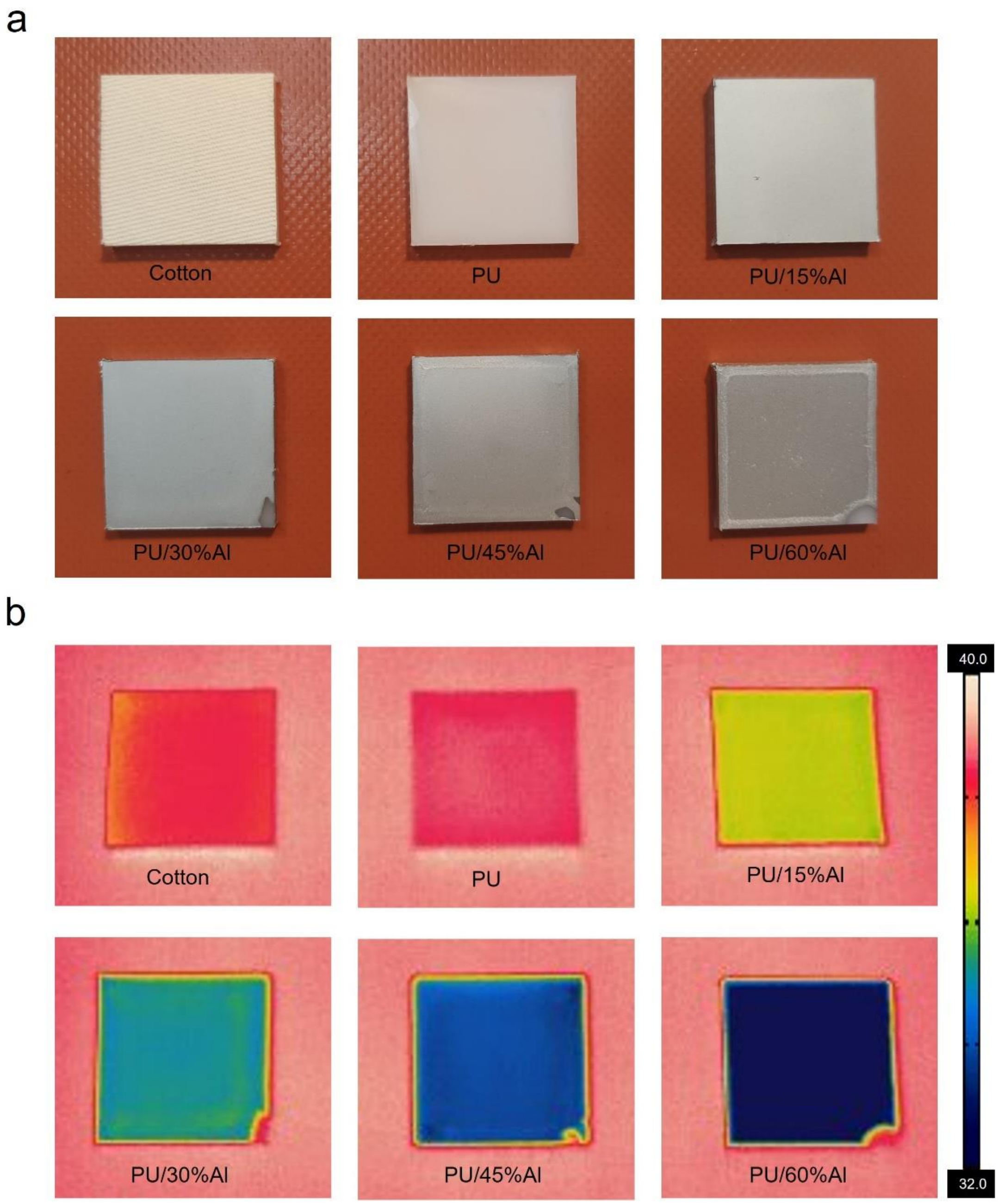

Fig. S7. The IR radiation insulation of cotton textile and PU/Al coatings with PE plate. (a) Photographs of the PU/Al coatings and other control samples with PE plate on the silica gel hot stage. (b) The corresponding IR thermal images after setting the heater temperature to 40°C. The PU/Al coatings present lower temperature with the increasing Al platelets content, and PU coating presents higher temperature than cotton textile.

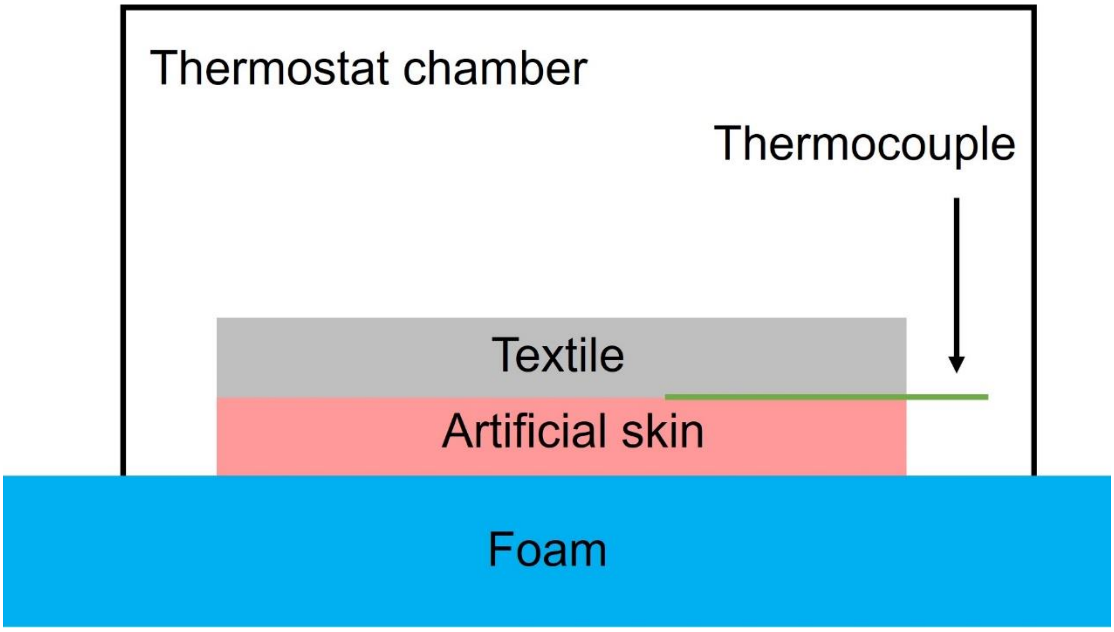

Fig. S8. Scheme of artificial skin and thermocouple for measure thermal insulation of textile in thermostat chamber.

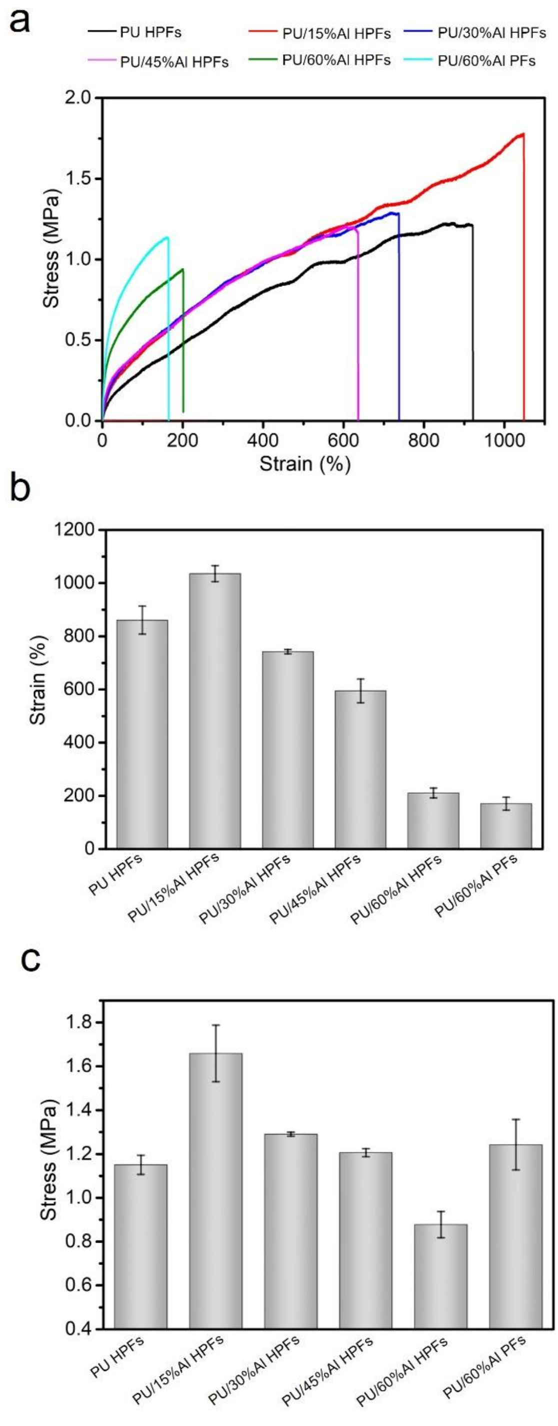

Fig. S9. The mechanical property of PU/Al HPFs. (a) Typical tensile stress-strain curves of different PU/Al HPFs. (b) The average elongation of the PU/Al HPFs decreases with the increasing Al platelets content, while the elongation of PU/15%Al HPFs is larger than PU HPFs. (c) The average tensile strength of the PU/Al HPFs decrease with the increasing Al platelets content, while tensile strength of PU/15%Al HPFs are large than PU HPFs, and tensile strength of PU/60%Al PFs is larger than PU/60%Al HPFs.

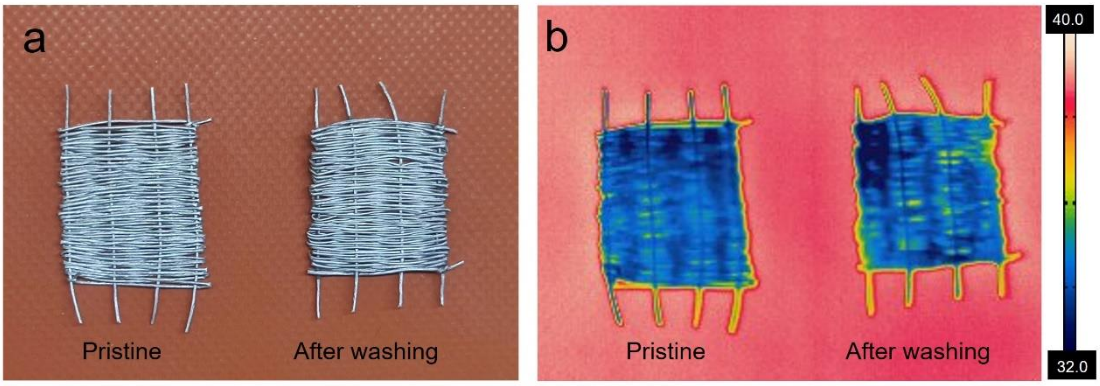

Fig. S10. The optical and IR thermal image of pristine and after washing PU/60%Al HPFs textiles. (a) The optical image showing that the morphology of PU/60%Al HPFs textile after washing treatment in washing machine has no difference compared with pristine PU/60%Al HPFs textile. (b) The IR thermal image showing that the PU/60%Al HPFs textile after washing treatment has similar low temperature compared with the pristine PU/60%Al HPFs textile.

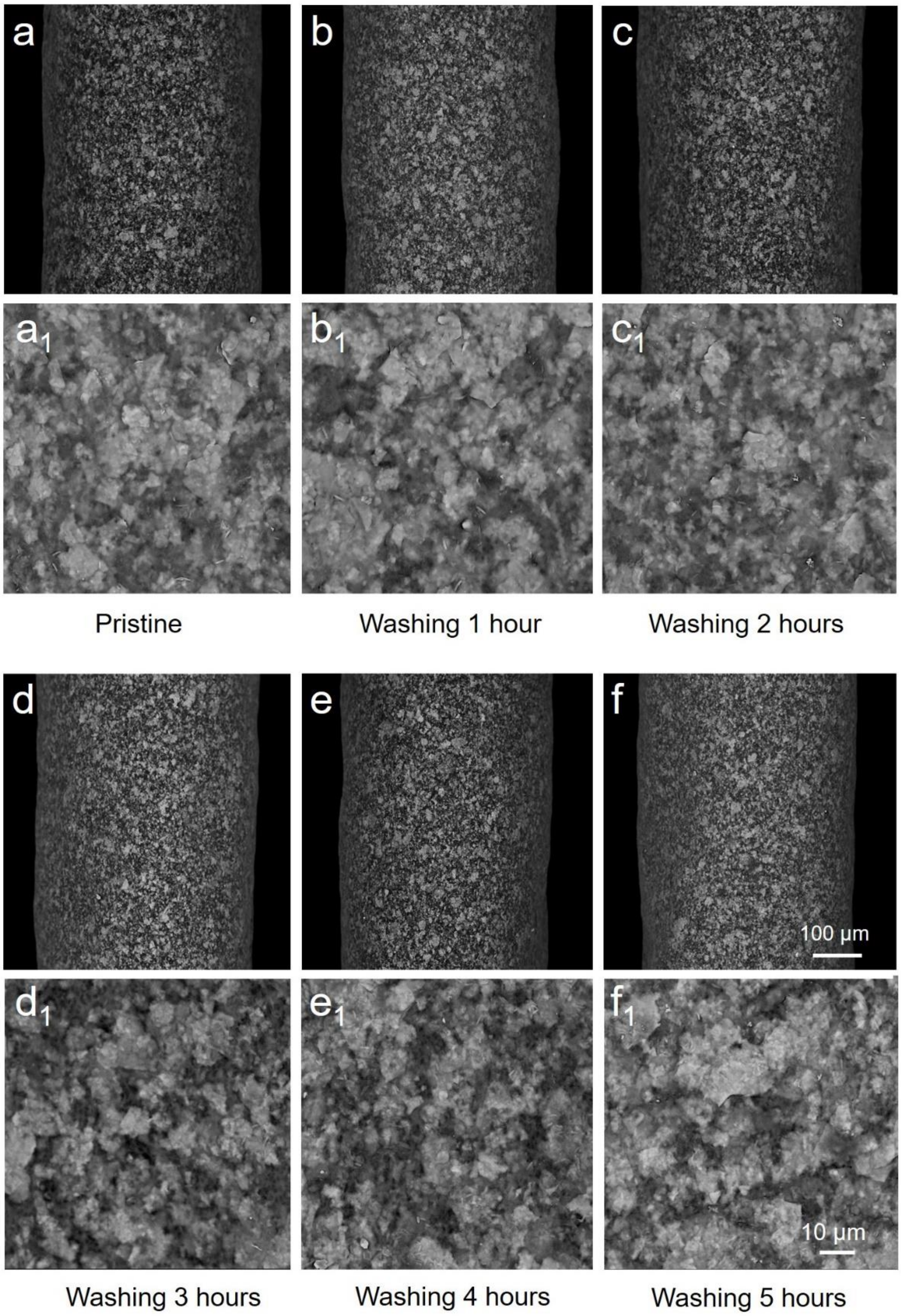

Fig. S11. The SEM images of the surface morphology of PU/Al HPFs before and after washing treatment. The surface morphology of PU/Al HPFs after washing does not change.