

Supporting information:

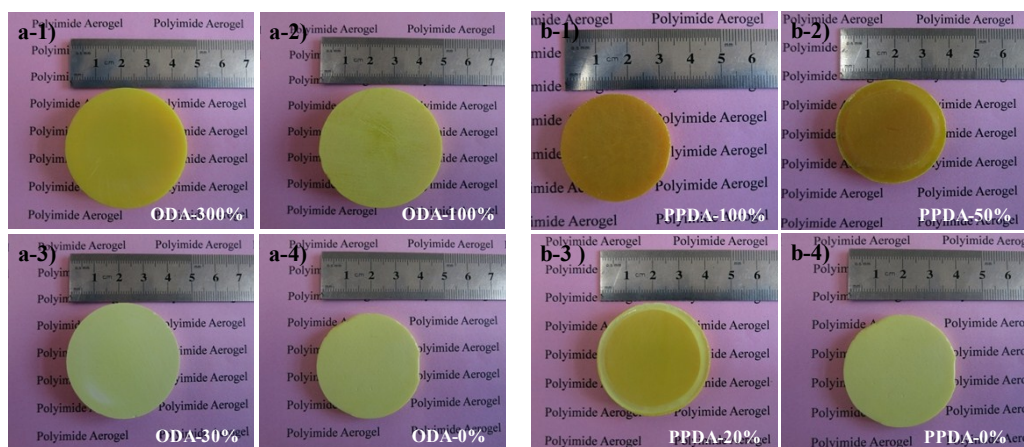


Fig. S1 Digital images of BTMSPA cross-linked polyimide aerogels.

As shown in **Fig. S1**, the color of the resulting polyimide aerogels are varied with the combinations of diamines. The appearance of PI-FBs are all yellow and became darker with the increasing amount of ODA. While PI-RBs tend to be orange, and turn yellow with the decreasing amount of PPDA.

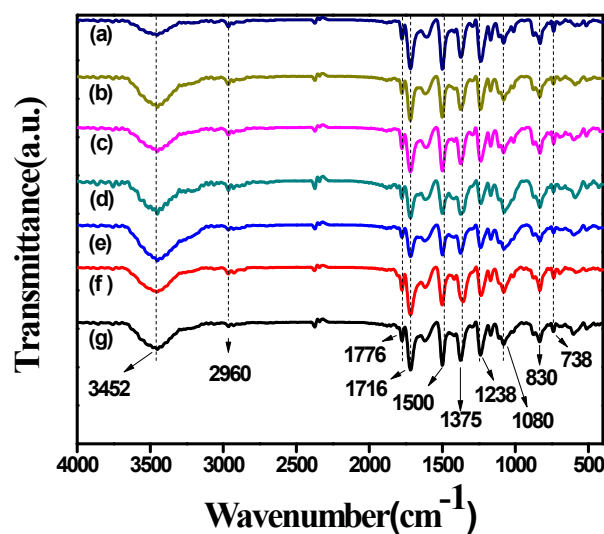


Fig. S2 FT-IR spectra of the BTMSPA cross-linked polyimide aerogels. (a), 300% ODA and 100% BAPOPP; (b), 100% ODA and 100% BAPOPP; (c), 30% ODA and 100% BAPOPP; (d), 100% PPDA and 100% BAPOPP; (e), 50% PPDA and 100% BAPOPP; (f), 20% PPDA and 100% BAPOPP; (g) only BAPOPP.

Fig. S2 shows the FT-IR spectra of all the obtained polyimide aerogels, the characteristic bands containing 1776 cm^{-1} (asymmetric imide C=O), 1716 cm^{-1} (symmetric imide C=O) and 1375 cm^{-1} (imide C-N) indicated that the imidization is complete. The other bands in the spectra (including 1618 cm^{-1} , 1500 cm^{-1} , 1419 cm^{-1} , 1238 cm^{-1} , 1168 cm^{-1} , 875 cm^{-1} and 833 cm^{-1}) all agree with the values of the previously report polyimide aerogels^{26, 27, 29} except the band at 1080 cm^{-1} attributed to the vibration of Si-O-Si in the network structures.³⁶

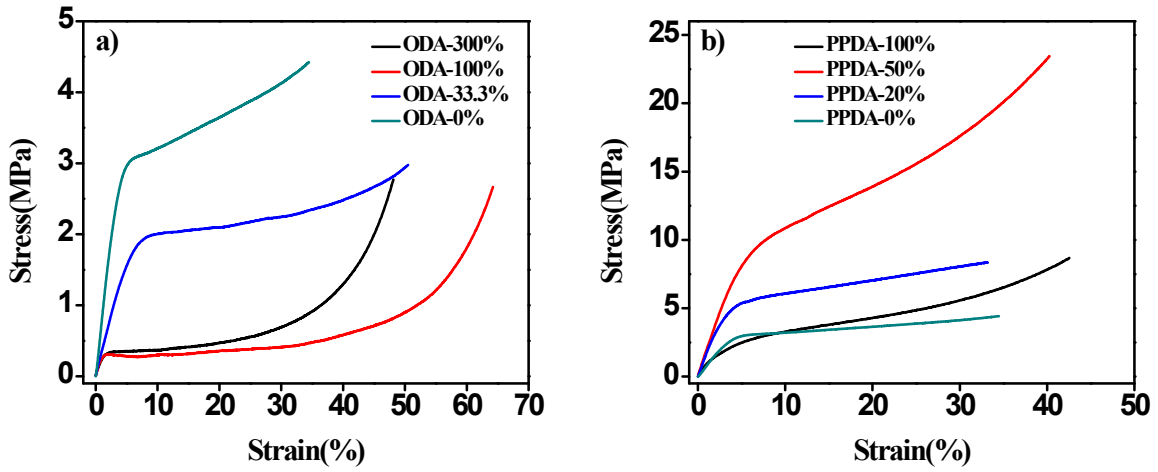


Fig. S3 The stress-strain curves of the obtained polyimide aerogels.

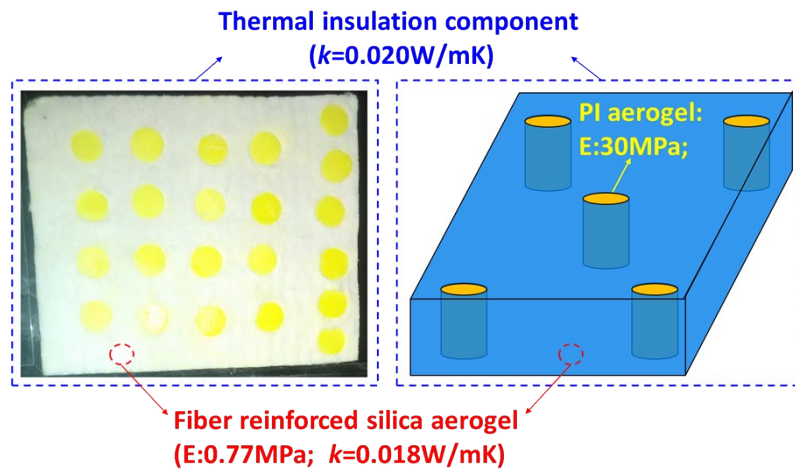
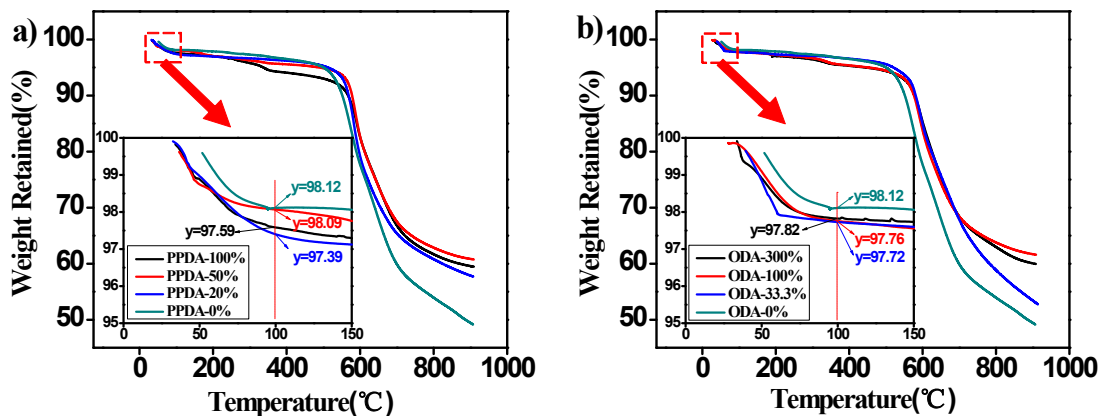


Fig. S4 Image and schematic diagram of the thermal insulation component. Thermal conductivity of the fiber reinforced silica aerogels and the component is measured on a HFM436 thermal conductivity analyzer (NETZSCH, Germany).



Samples	Pre-weight loss at 100 °C (a) (%)	Conversion formula from a to b $b=a+(100-a)*5\%$	5% weight loss point in the TGA curves (b) (%)
ODA-300	2.18	$b=a+(100-a)*5\%$	7.07
ODA-100	2.24		7.13
ODA-30	2.28		7.17
ODA-0	1.88		6.79
PPDA-100	2.41		7.29
PPDA-50	1.91		6.81
PPDA-20	2.61		7.48
PPDA-0	1.88		6.79

Fig. S5 Detailed illustration for the relationship between the actual 5 % weight loss temperature of polyimide aerogels and the 5% weight loss point in the obtained TGA curves. a) and b) show the retained weight (y) at 100 °C for all the samples; The symbol a in the table represents the weight loss at 100 °C and the relationship between y and a is $a=100-y$; The symbol b in the table represents the corresponding 5% weight loss point in the obtained TGA curves and the relation between b and a is $b=a+(100-a)*5\%$. The results indicates that “the actual 5 % weight loss temperature of the polyimide aerogels should be corresponding to the point of around 7 % in the TGA curves”.