SUPPORTING INFORMATION

FIRE-RESISTANT HYDROGEL-FABRIC LAMINATES: A SIMPLE CONCEPT THAT MAY SAVE LIVES

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Video 1. Fire resistance test of fire-retarding wool

This file contains a movie that shows the fire resistance of fire-retarding wool of 6mm thickness. When exposed to a 1000^0C flame using a blowtorch, it burns within few seconds.

Video 2. Fire resistance test of Aramid fabric

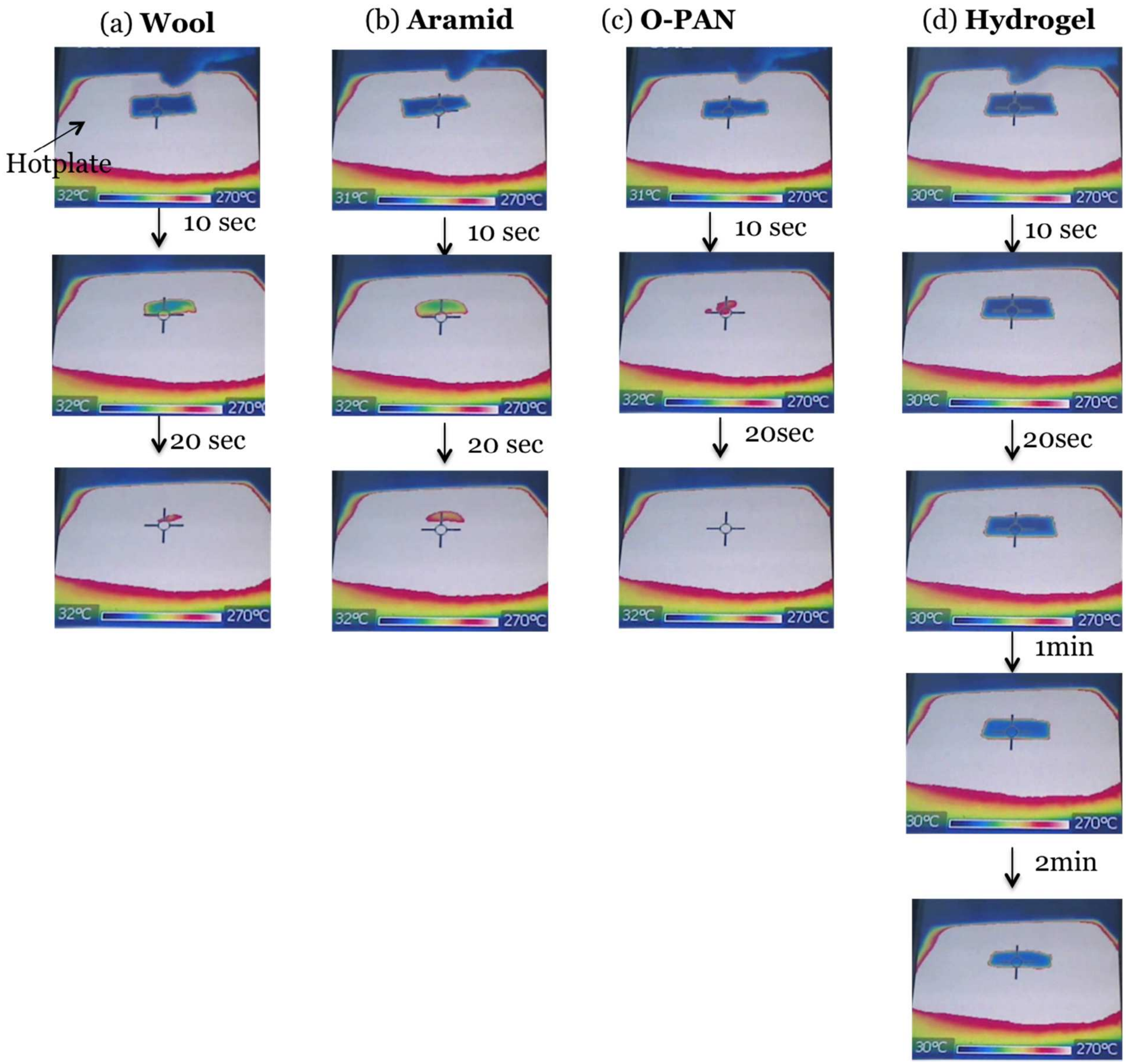
This file contains a movie of the fire resistance test of Aramid fabric of 6mm thickness. It burns within few seconds when exposed to a 1000^0C flame.

Video 3. Fire resistance test of O-PAN fabric

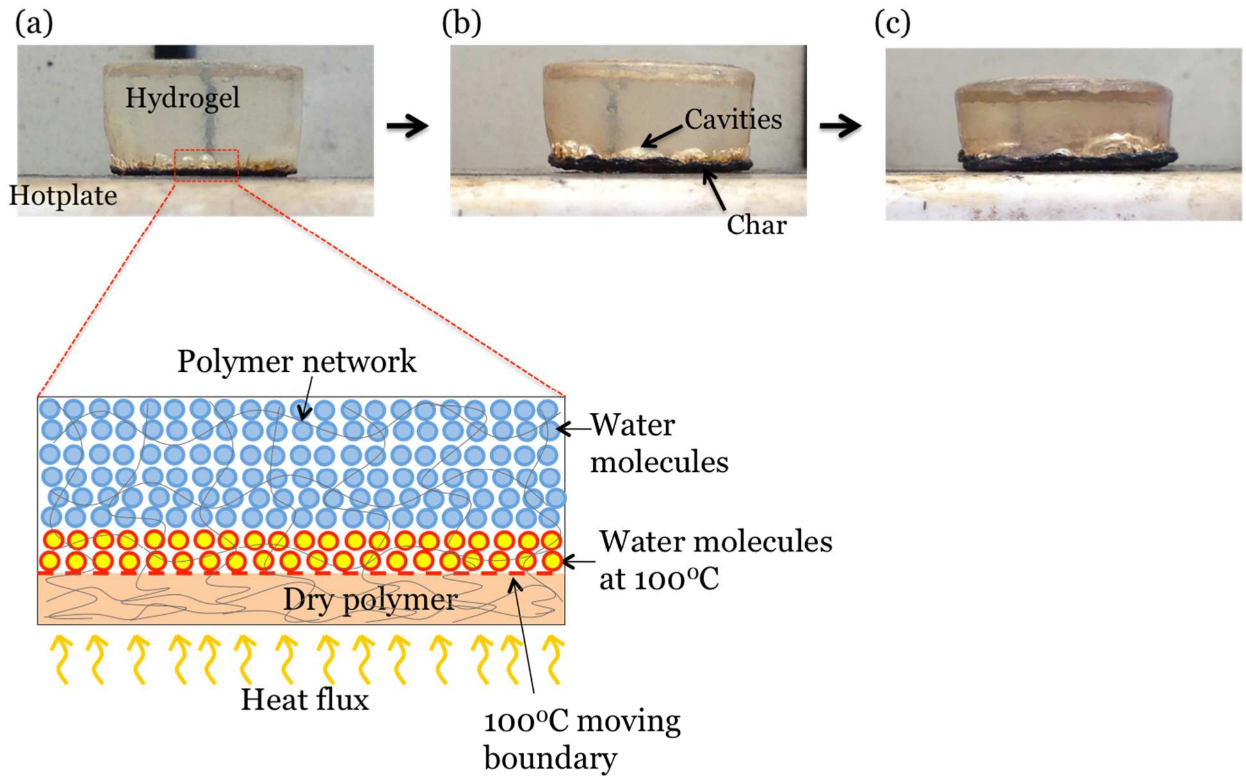
This file demonstrates the fire resistance of O-PAN fabric. A 6mm thick O-PAN fabric resists a 1000^0C flame for 8mins.

Video 4. Fire resistance test of hydrogel

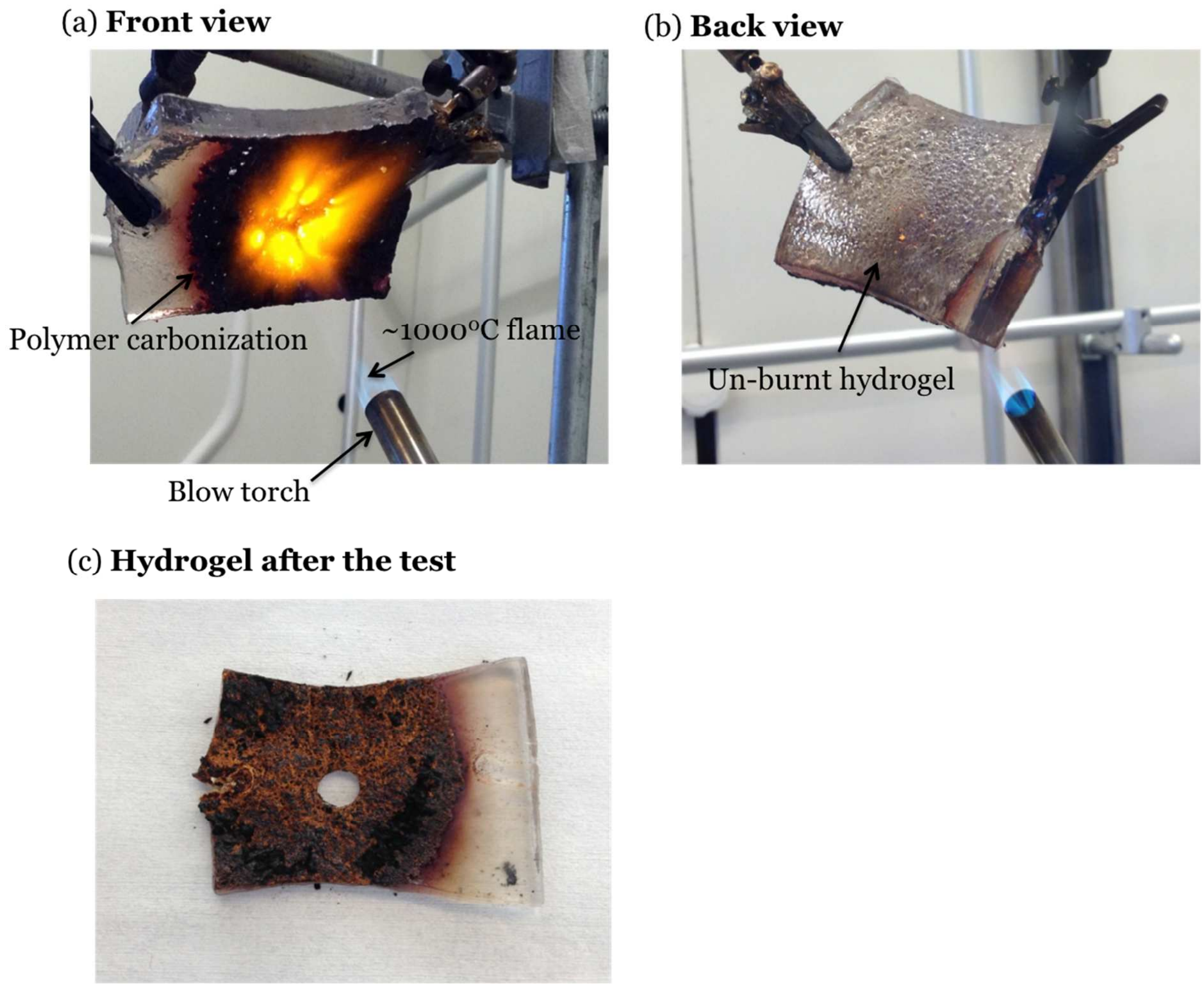
This file contains a movie that demonstrates the fire resistance of a 6mm thick hydrogel. It survives a 1000^0C flame for 4mins before burning through.



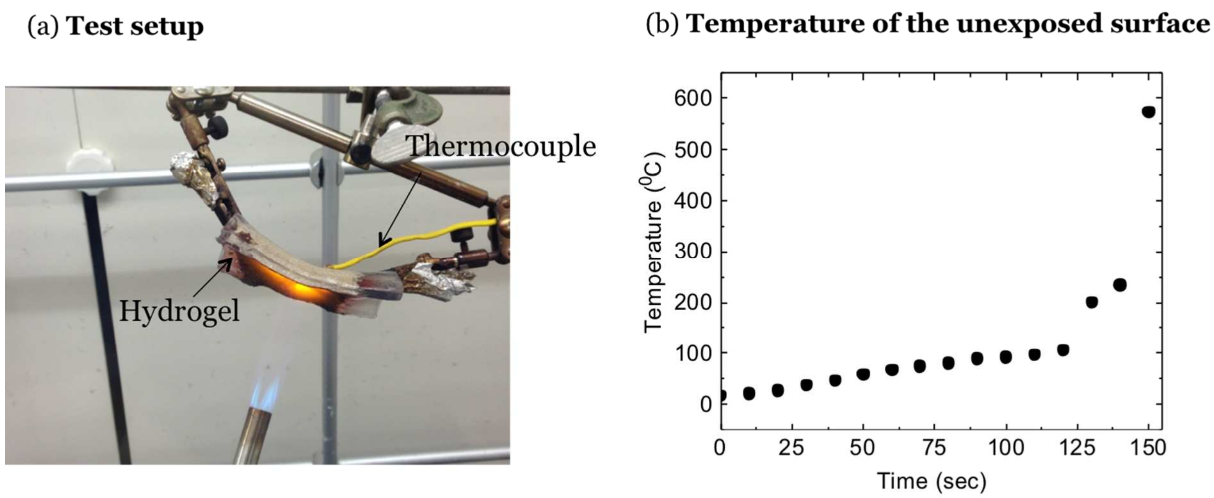
S1. Thermal imaging of fire retarding materials**.** Time-lapse infrared thermal images of (a) Wool, (b) Aramid, (c) O-PAN and (d) hydrogel on top of a hotplate at 500^0C. All the samples are 3mm thick, 55mm long, and 37.5mm wide. The upper temperature limit of the thermal camera is 270^0C.



S2. Burning process of a hydrogel. (a) Hydrogel samples with 15 mm thickness and 30 mm diameter are placed on a hotplate at 500°C. Tiny cavities are formed inside the hydrogel near the bottom surface. The schematic illustrates the mechanism: Transport of water by diffusion through the dry polymer network is slow. As a result, small steam-filled cavities form inside the hydrogel. These cavities burst as pressure builds up. As water evaporates, the dry polymer region grows and eventually chars. (b) The tiny cavities combine to form bigger cavities. (c) The thickness of the hydrogel decreases as the water evaporates and the charred layer grows.



S3. Observations during the flame test. (a) For the hydrogel facing the flame, water starts to evaporate and the dry polymer carbonizes during the flame test. (b) Back surface of the hydrogel remains soft and flexible similar to its original state. (c) Image of the hydrogel after it is pierced by the flame.



S4. Measuring temperature during the flame test. (a) Test set up (b) Temperature of the unexposed surface with time.