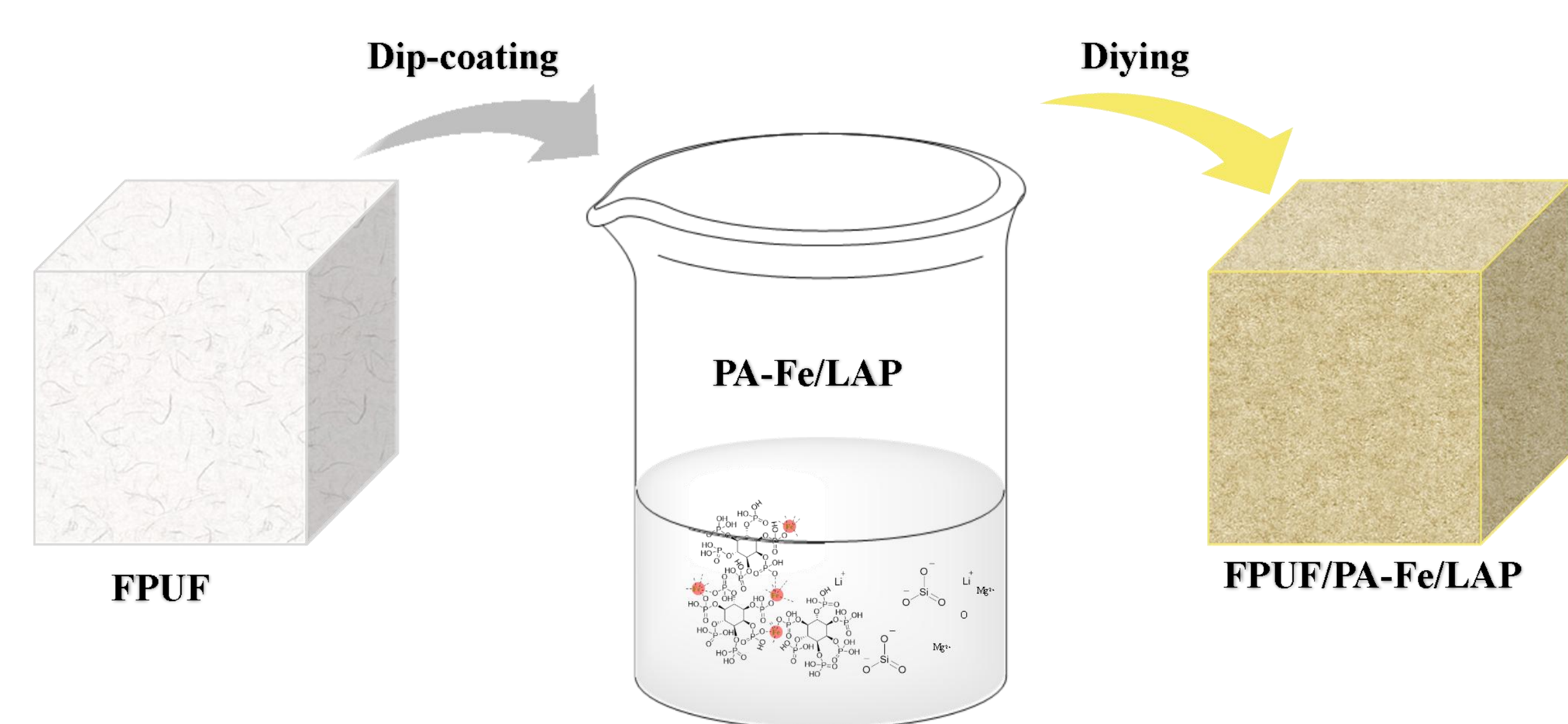


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Abstract

In order to improve the flame retardancy and antidripping while maintain its mechanical properties of FPUF, an eco-friendly coating was prepared on the FPUF surface by dipping with phytic acid (PA), $\text{Fe}_2(\text{SO}_4)_3$, and laponite (LAP). The thermal stability, flame retardancy, combustion behavior, smoke density and mechanical properties were explored in detail. Some interesting results were obtained.

Preparation process

FPUF: flexible polyurethane foam

PA-Fe/LAP: a coating consisting of iron-complex of phytic acid and laponite

Fig. 1. Preparation process of coated FPUF

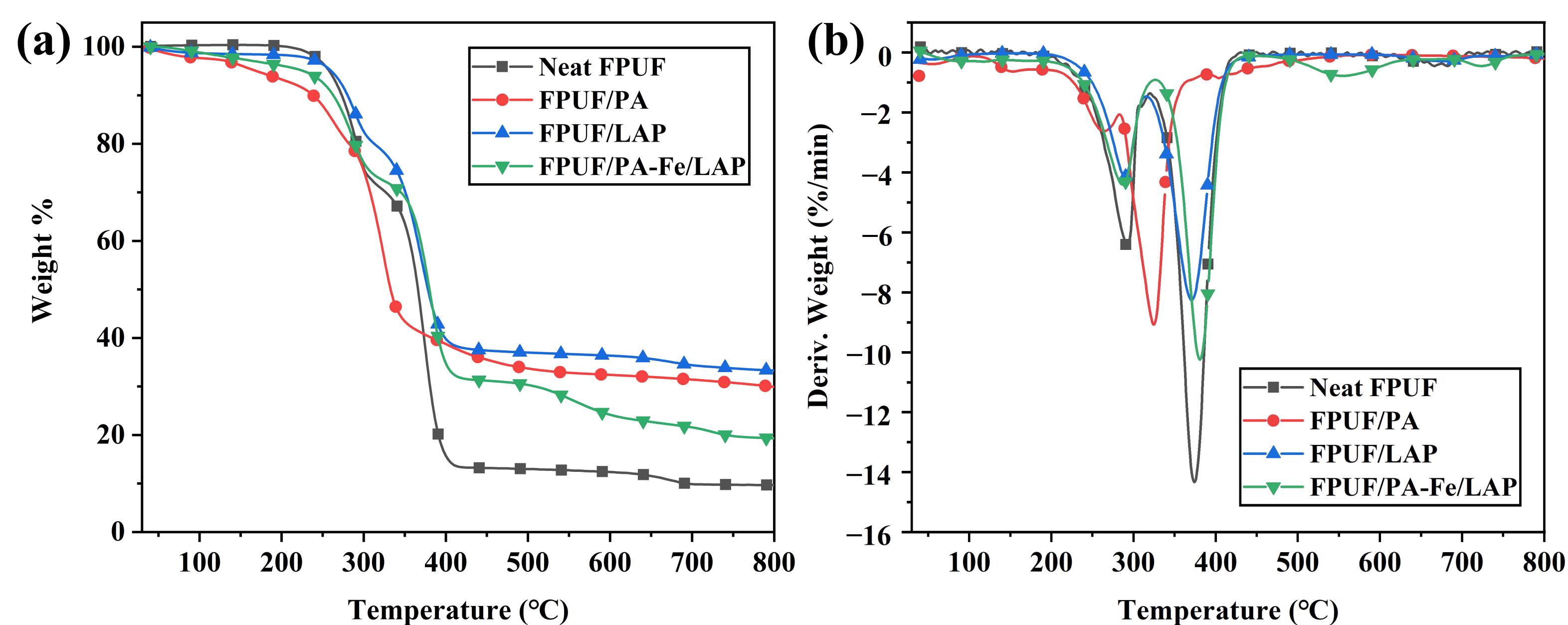
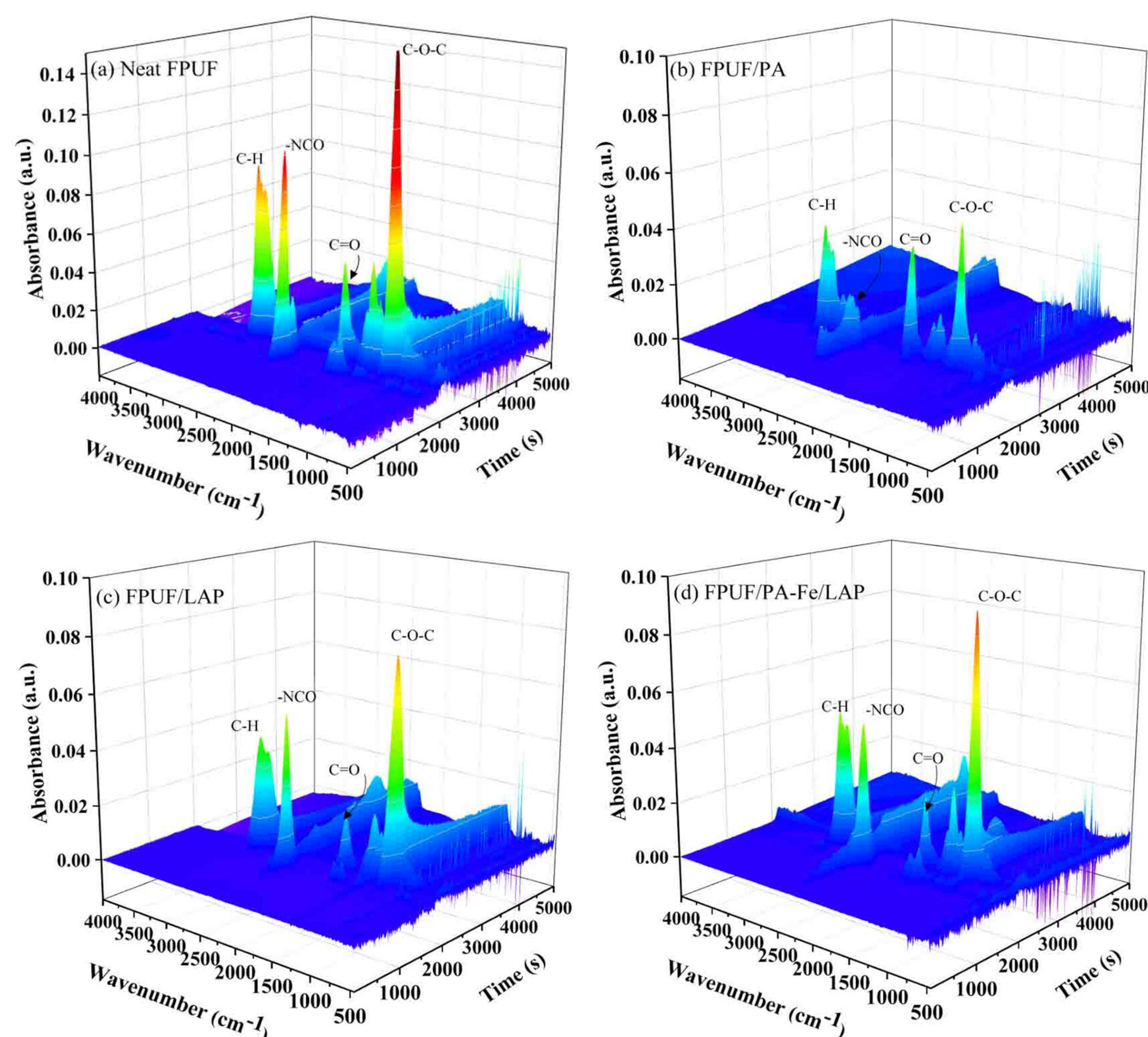
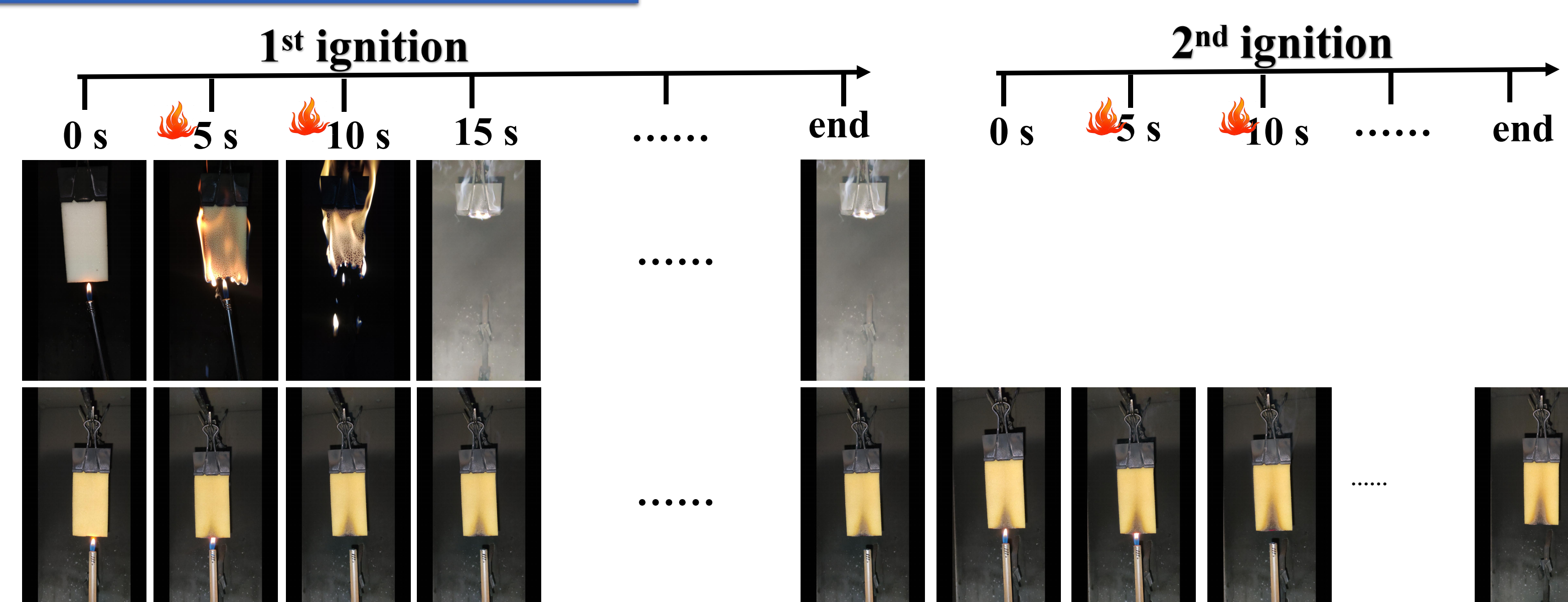
Thermal stabilities in N_2 Fig. 2 TG (a) and DTG (b) curves of neat FPUF, FPUF/PA, FPUF/LAP and FPUF/PA-Fe/LAP in N_2 

Fig. 3 3 D FTIR spectra of neat FPUF, FPUF/PA, FPUF/LAP and FPUF/PA-Fe/LAP

Flame retardancynote: 1st and 2nd refer to first ignition, second ignition.

The spark (🔥) represents the period of ignition, otherwise the period of combustion.

Fig. 4. Digital images of neat FPUF, FPUF/PA, FPUF/LAP, FPUF/PA-Fe and FPUF/PA-Fe/LAP during UL-94

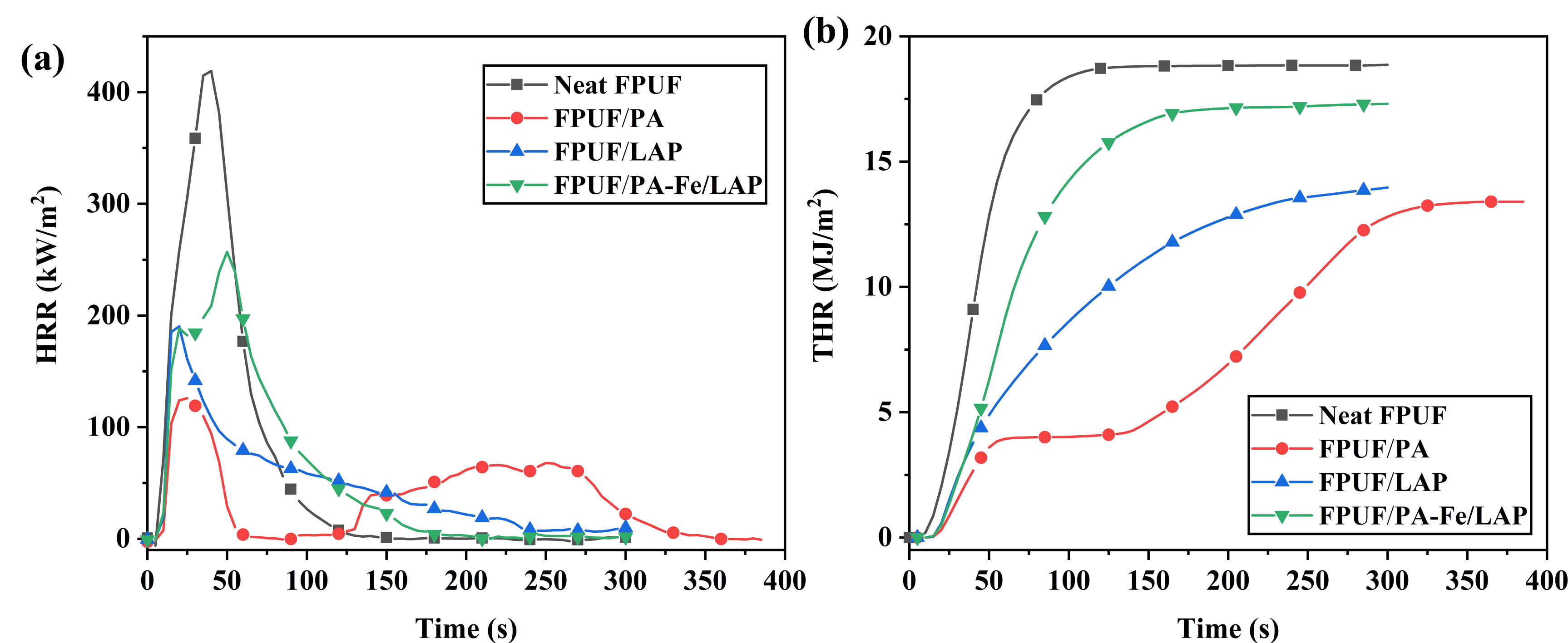


Fig. 5 The HRR (a) and THR (b) curves for neat FPUF, FPUF/PA, FPUF/LAP and FPUF/PA-Fe/LAP by CCT

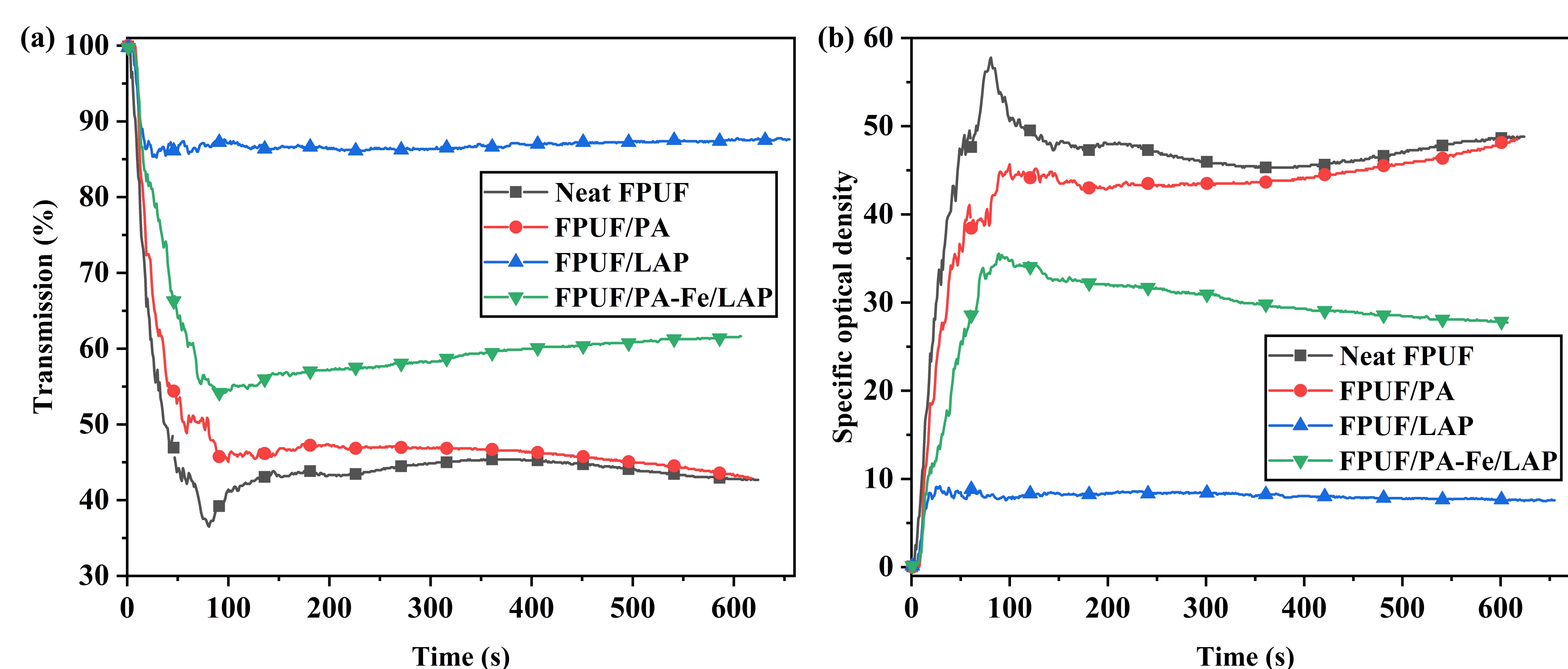


Fig. 6 Light transmission (a) and specific optical density (b) curves of neat FPUF, FPUF/PA, FPUF/LAP, and FPUF/PA-Fe/LAP by SDT

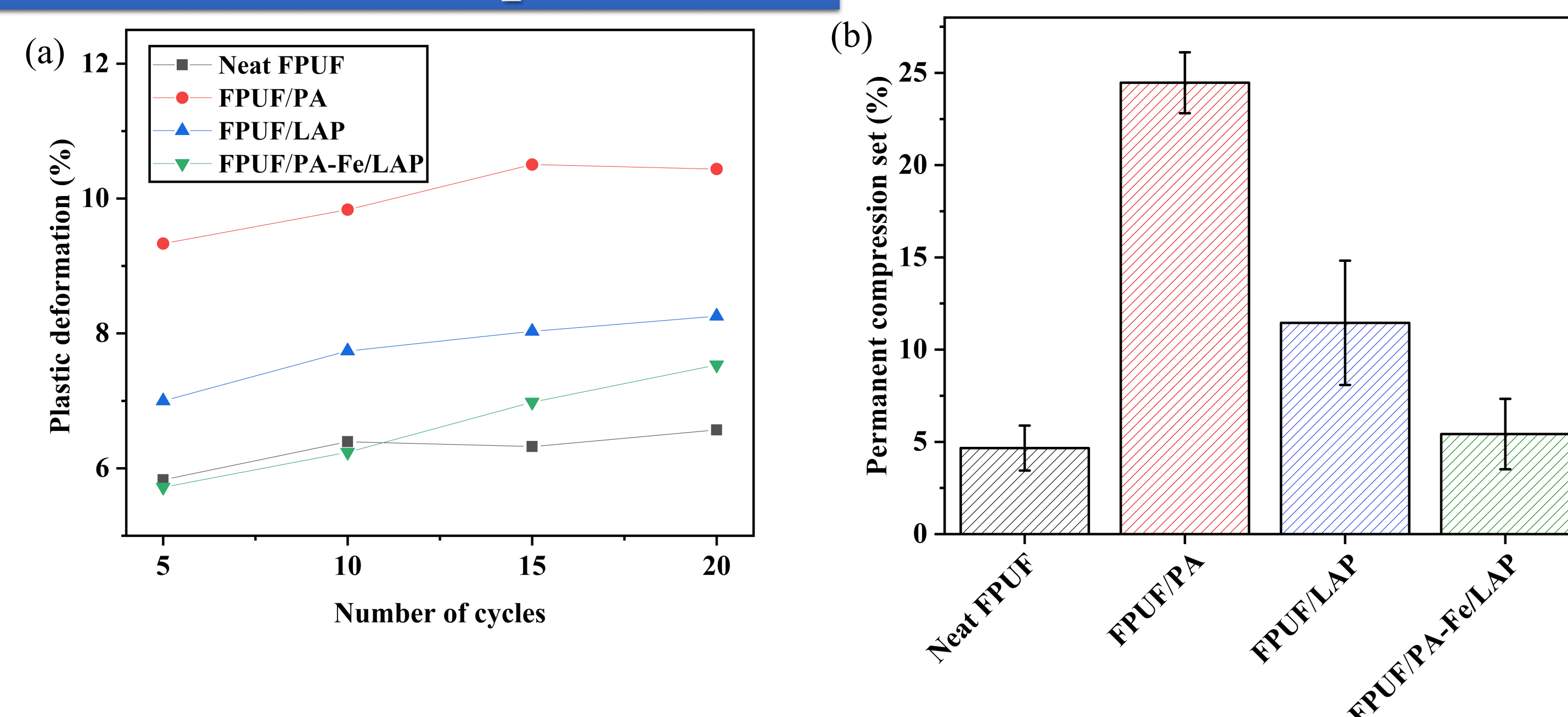
Mechanical Properties

Fig. 7 stress-strain (a) and permanent deformation (b) of neat FPUF, FPUF/PA, FPUF/LAP, and FPUF/PA-Fe/LAP

Conclusion

PA-Fe/LAP coating was constructed on the FPUF surface by dip-coating, which gives FPUF flame retardancy and antidripping without deteriorating its cyclic compression and permanent deformation. This work provides an effective way to meet enhancing the flame retardancy of FPUF.