

Polyurethanes have very good durability, physical and chemical properties. For this reason, they are often used in various industries. Most polyurethanes belong to the group of highly flammable materials and those that release toxic gases and smoke when burned. Therefore, it is very important to choose the right flame retardants.

The subject of the invention is a method of obtaining flame-retardant cast polyurethanes. The invention is particularly applicable to the production of polyurethane materials which may be exposed to direct fire during use.

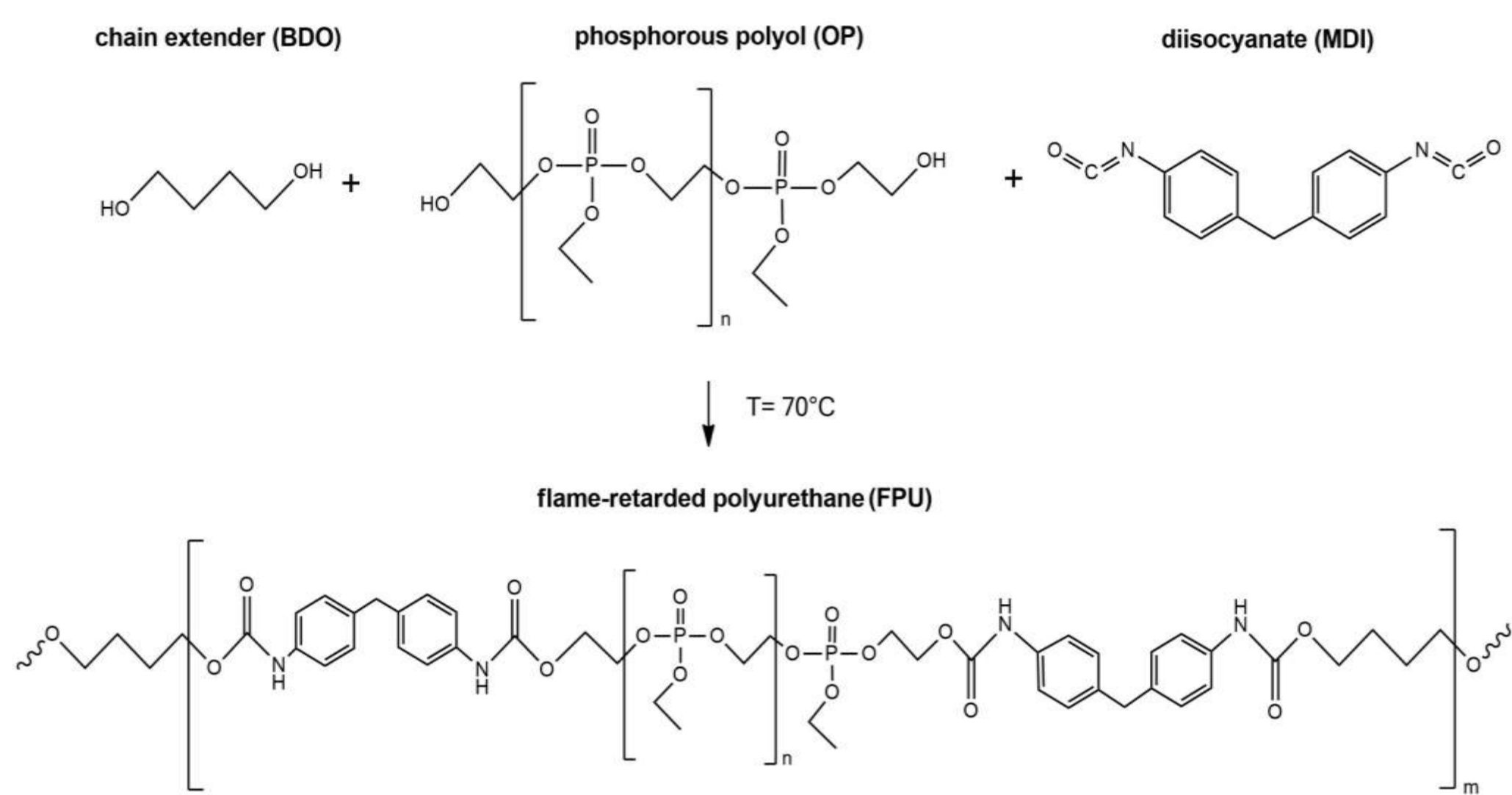


Fig. 1 Scheme of the synthesis of flame-retarded cast polyurethanes by . National Patent application in the Polish Patent Office No. P.434425.

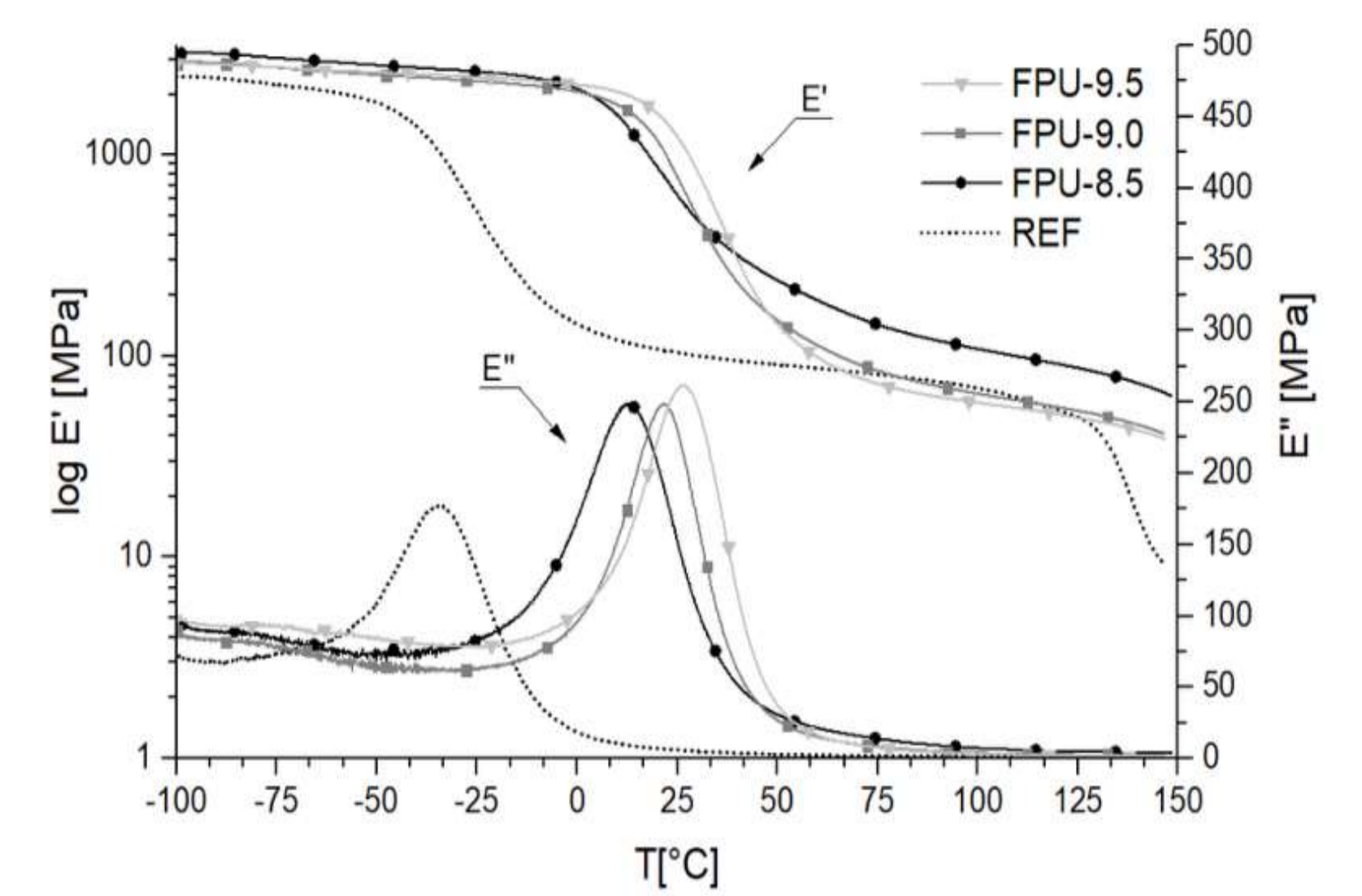


Fig. 4 DMA results of polyurethanes containing different amounts of phosphorus polyol (FPU-9.5, FPU-9.0, FPU-8.5) and reference material (REF).

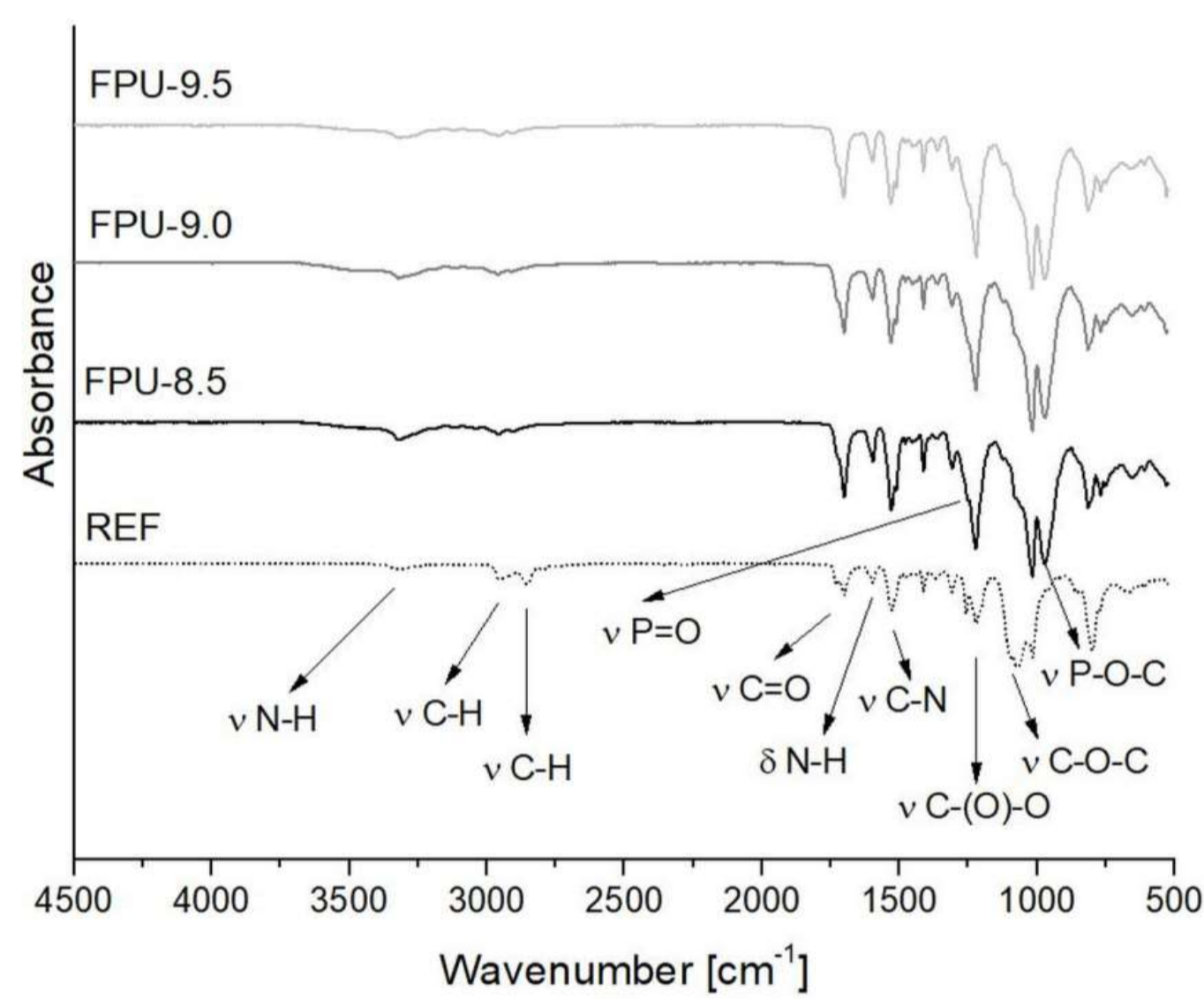


Fig. 2 FTIR spectra of polyurethanes containing different amounts of phosphorus polyol (FPU-9.5, FPU-9.0, FPU-8.5) and reference material (REF).

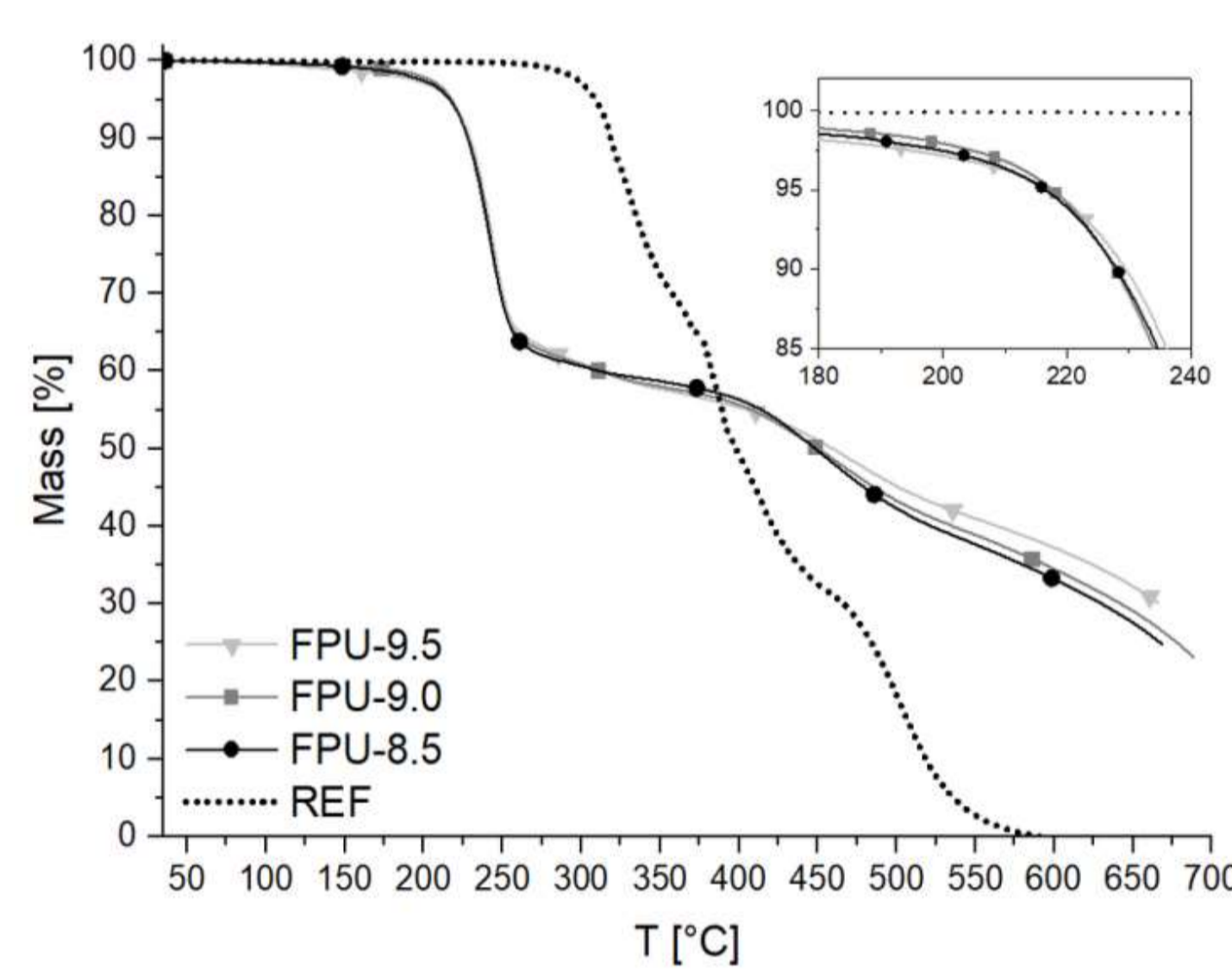


Fig. 3 TG results of polyurethanes containing different amounts of phosphorus polyol (FPU-9.5, FPU-9.0, FPU-8.5) and reference material (REF).

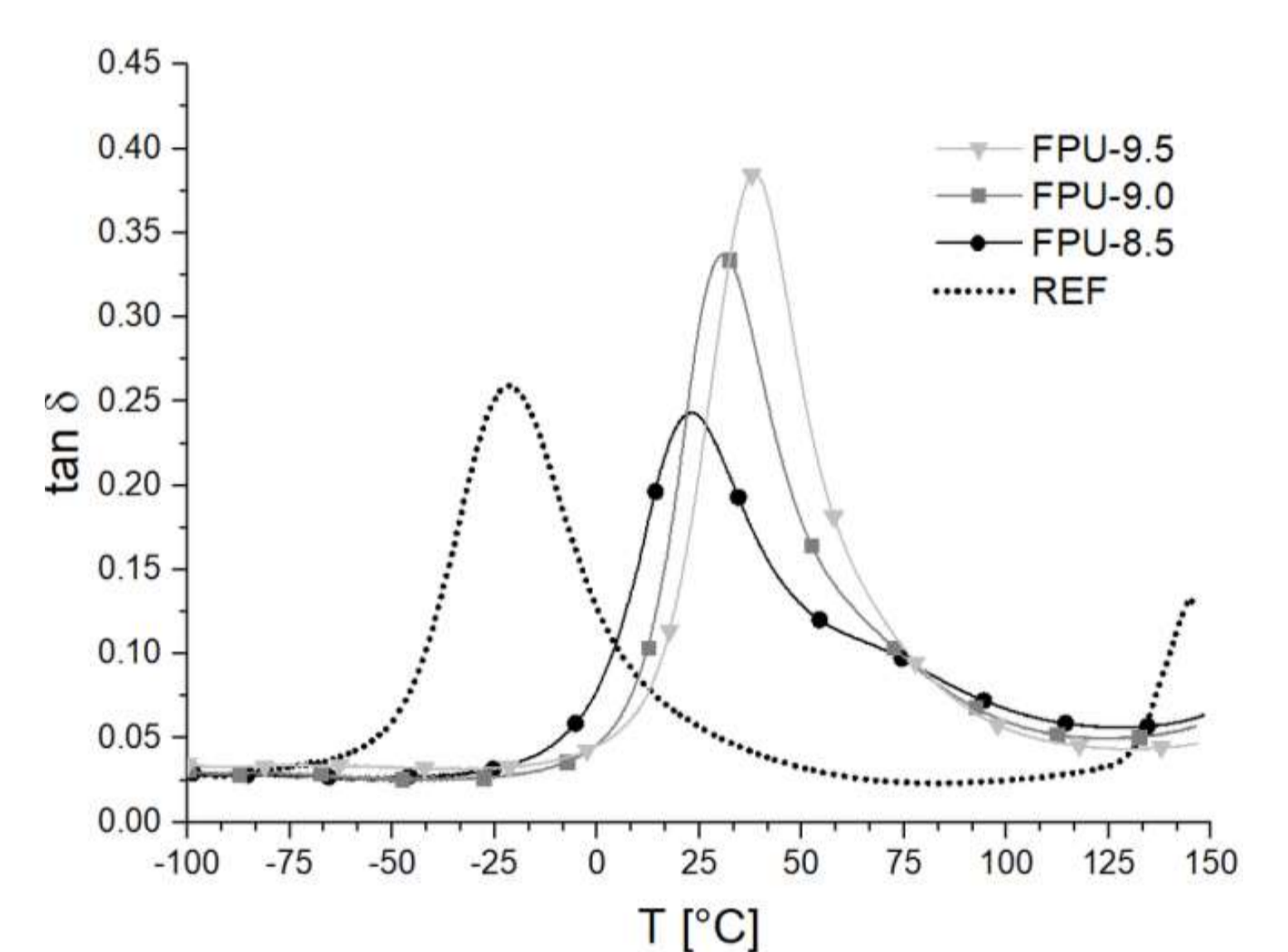


Fig. 5 Tangens delta curves of polyurethanes containing different amounts of phosphorus polyol (FPU-9.5, FPU-9.0, FPU-8.5) and reference material (REF).

Table 1 UL-94 and LOI tests results.

PU materials	Rating	Char formation	The burning time of the material after removing the fire source		Dripping	LOI [%]
			I flame application	II flame application		
REF	V-2	no	5 s	2 s	yes	22.4
FPU-8.5	V-0	yes	1 s	1 s	no	25.4
FPU-9.0	V-0	yes	1 s	1 s	no	25.4
FPU-9.5	V-0	yes	1 s	1 s	no	25.2

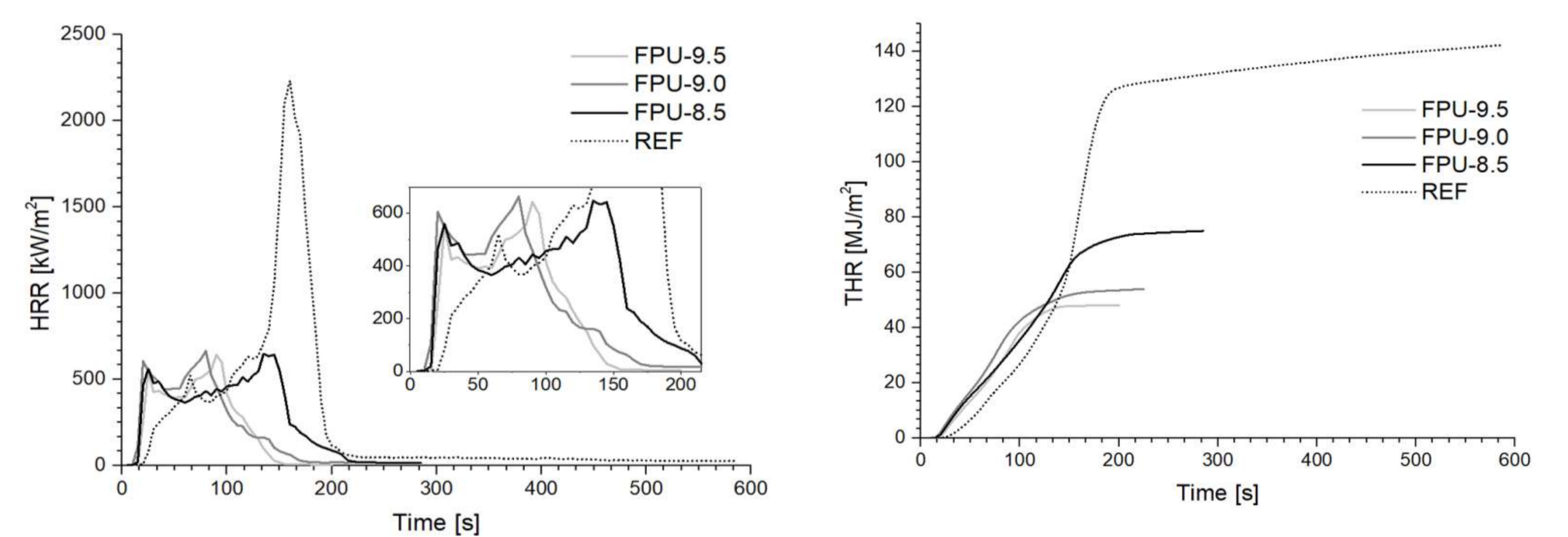


Fig. 6 Heat release rate and total heat release curves of flame-retarded cast polyurethanes.

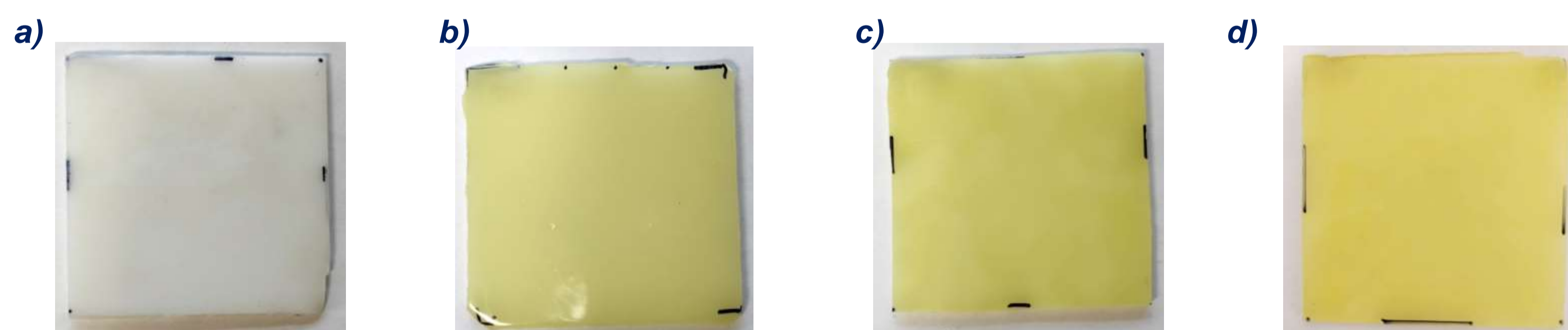


Figure 7. Polyurethanes before cone calorimeter tests: (a) REF, (b) FPU-8.5, (c) FPU-9.0, (d) FPU-9.5.

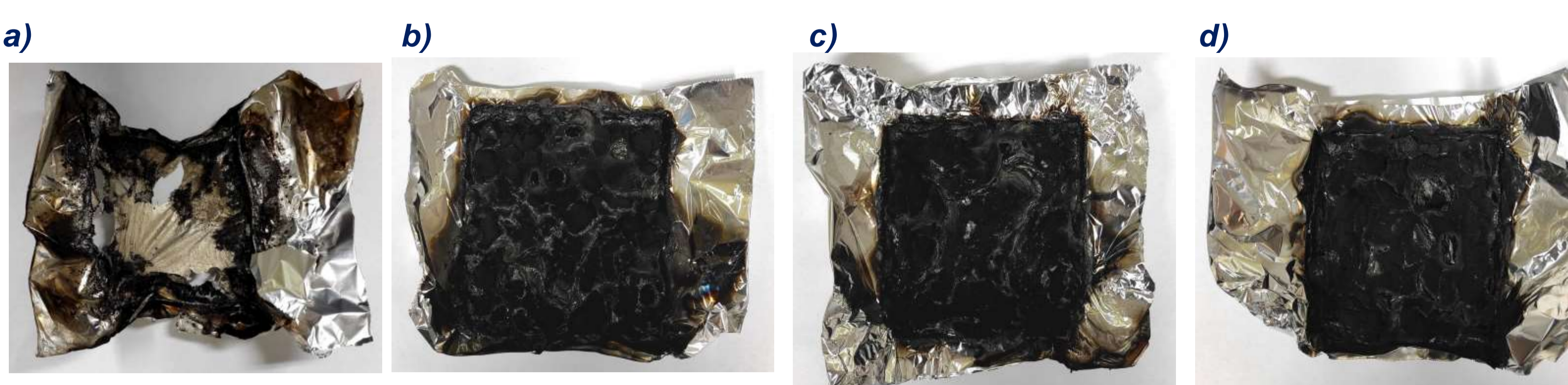


Figure 8. Polyurethanes after cone calorimeter tests: (a) REF, (b) FPU-8.5, (c) FPU-9.0, (d) FPU-9.5.