

Supporting Information

Flame-retardant finishing of cotton fabrics using DOPO functionalized alkoxy- and amido alkoxysilane

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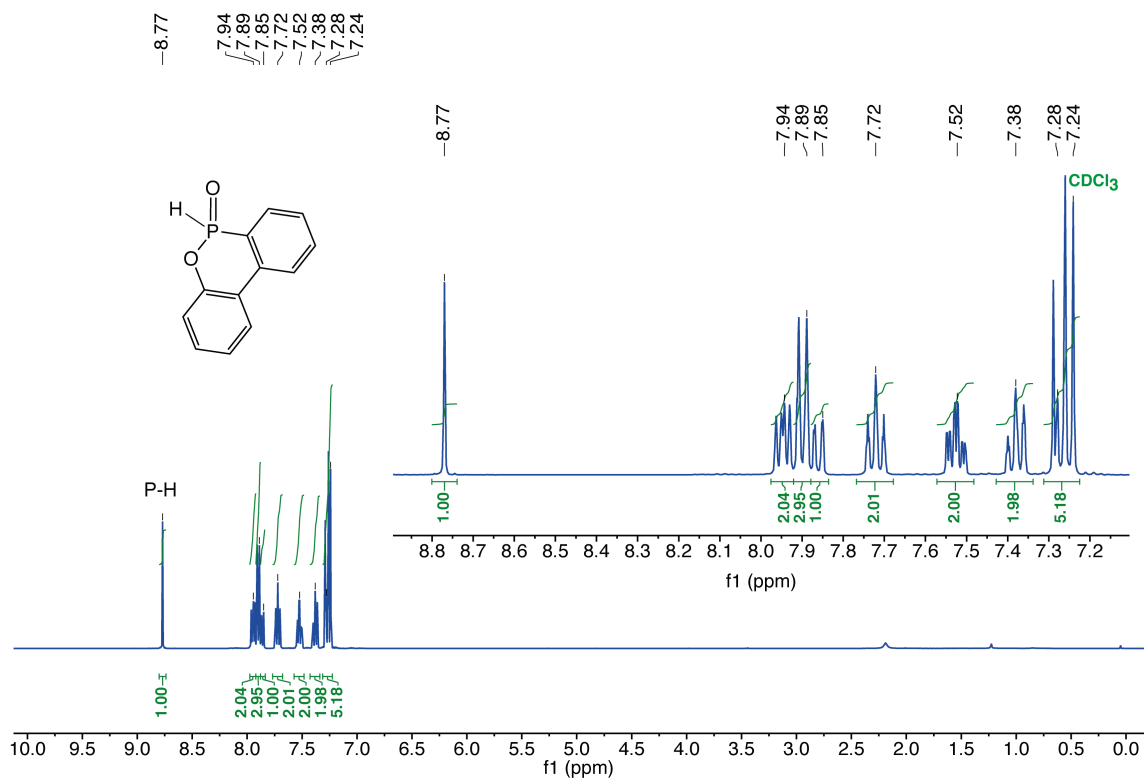


Fig. S1 ¹H-NMR spectrum of DOPO

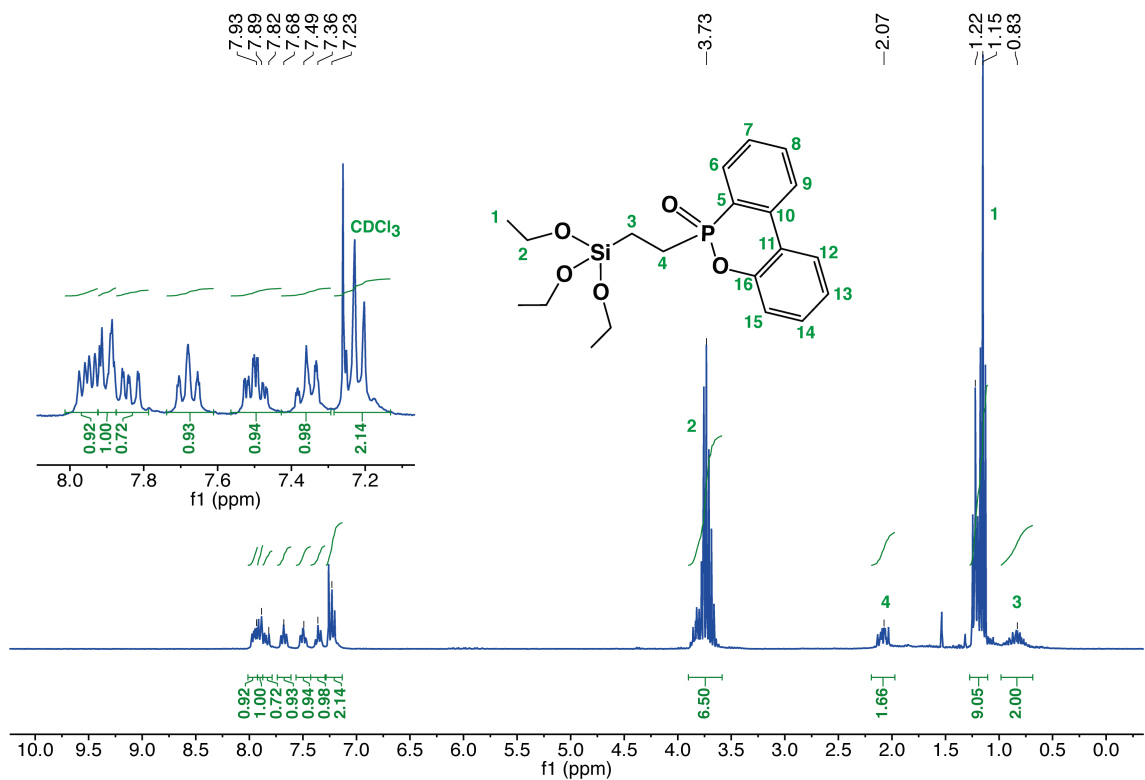


Fig. S2 ¹H-NMR spectrum of DOPO-ETES

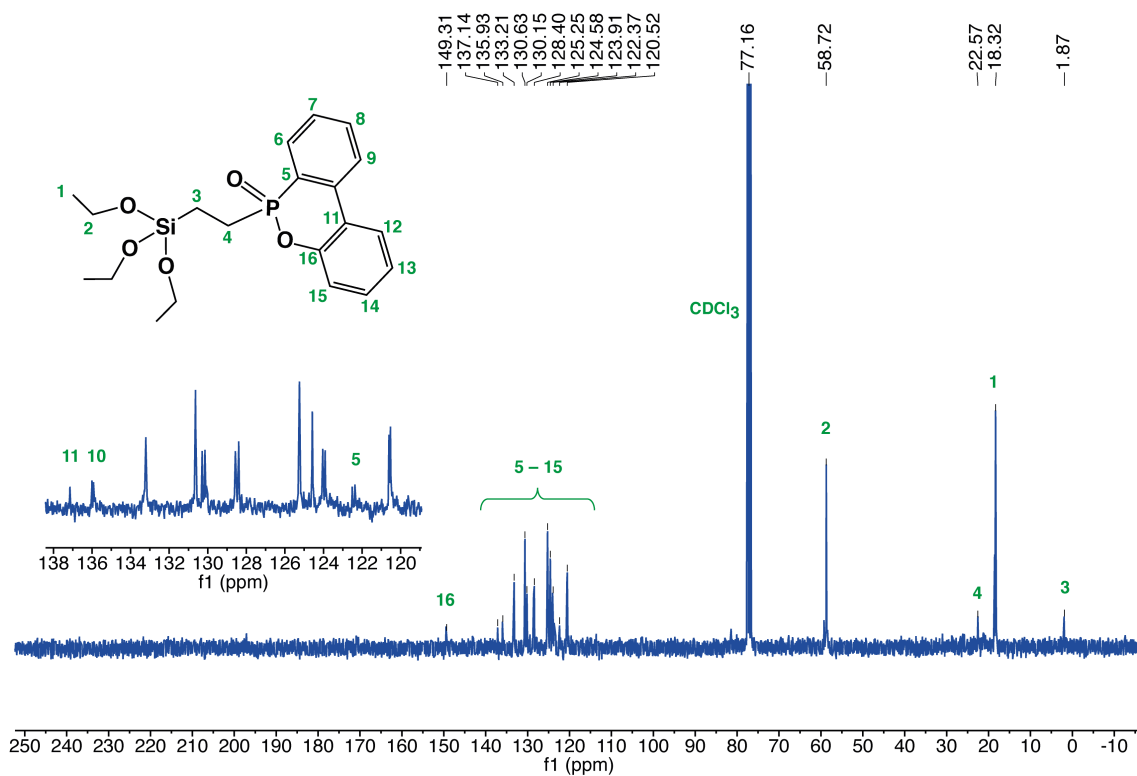


Fig. S3 ^{13}C -NMR spectrum of DOPO-ETES

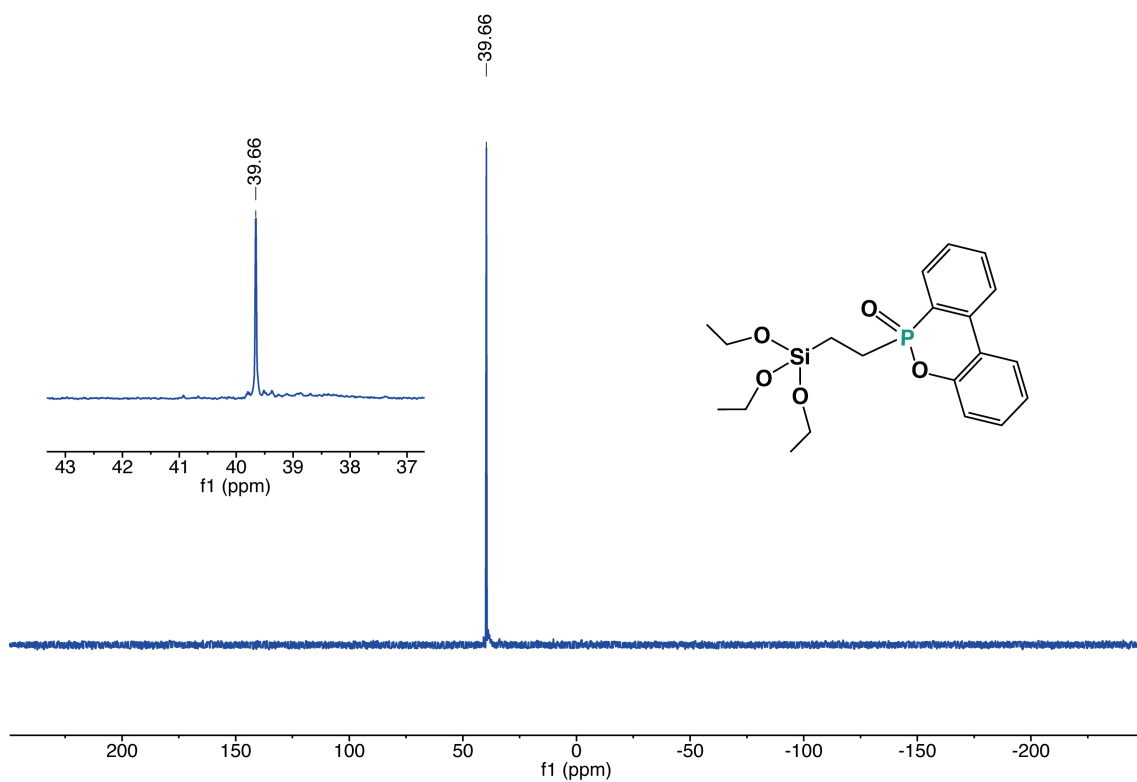


Fig. S4 ^{31}P -NMR spectrum of DOPO-ETES

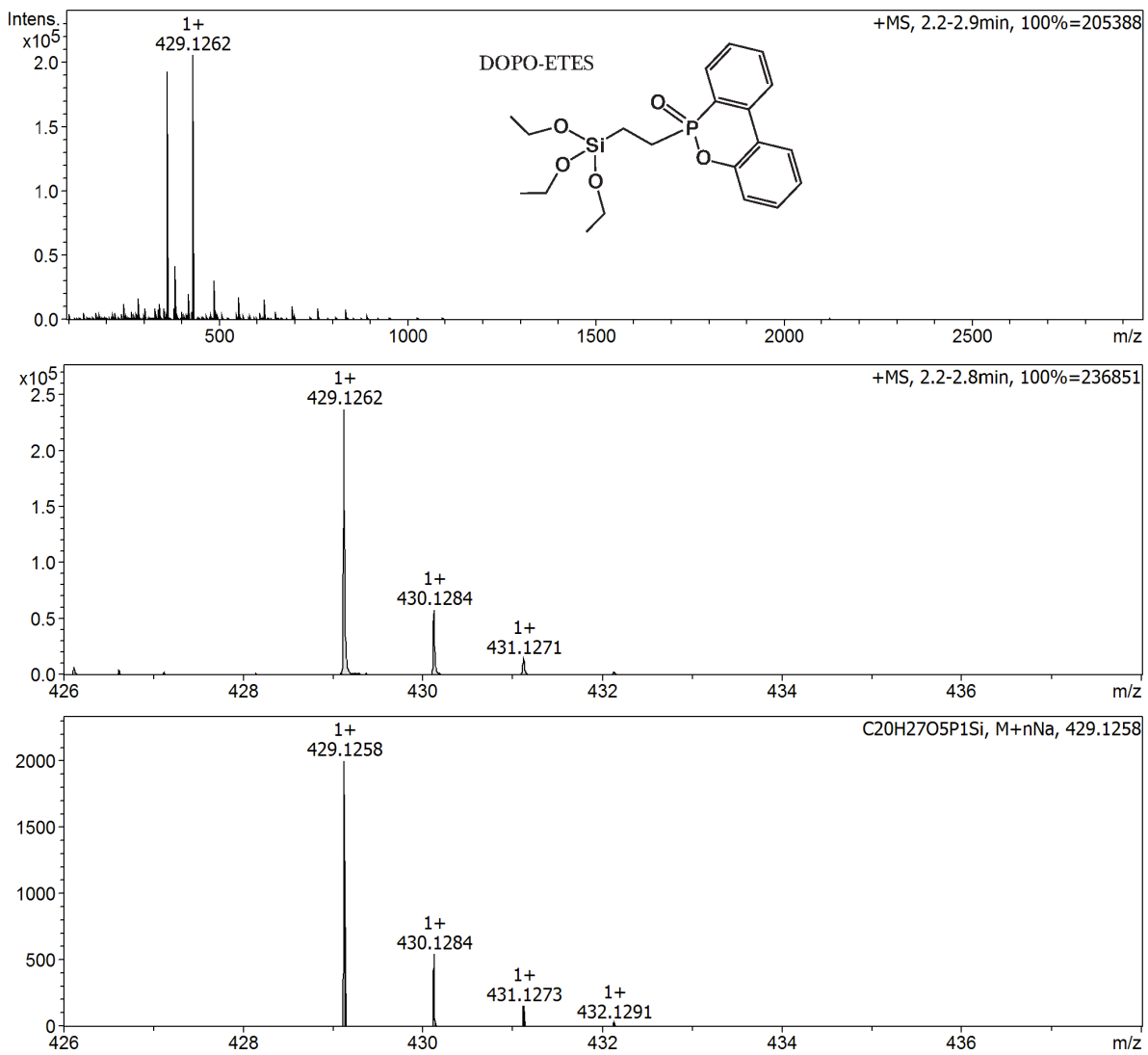


Fig. S5 High resolution MS spectrum of DOPO-ETES

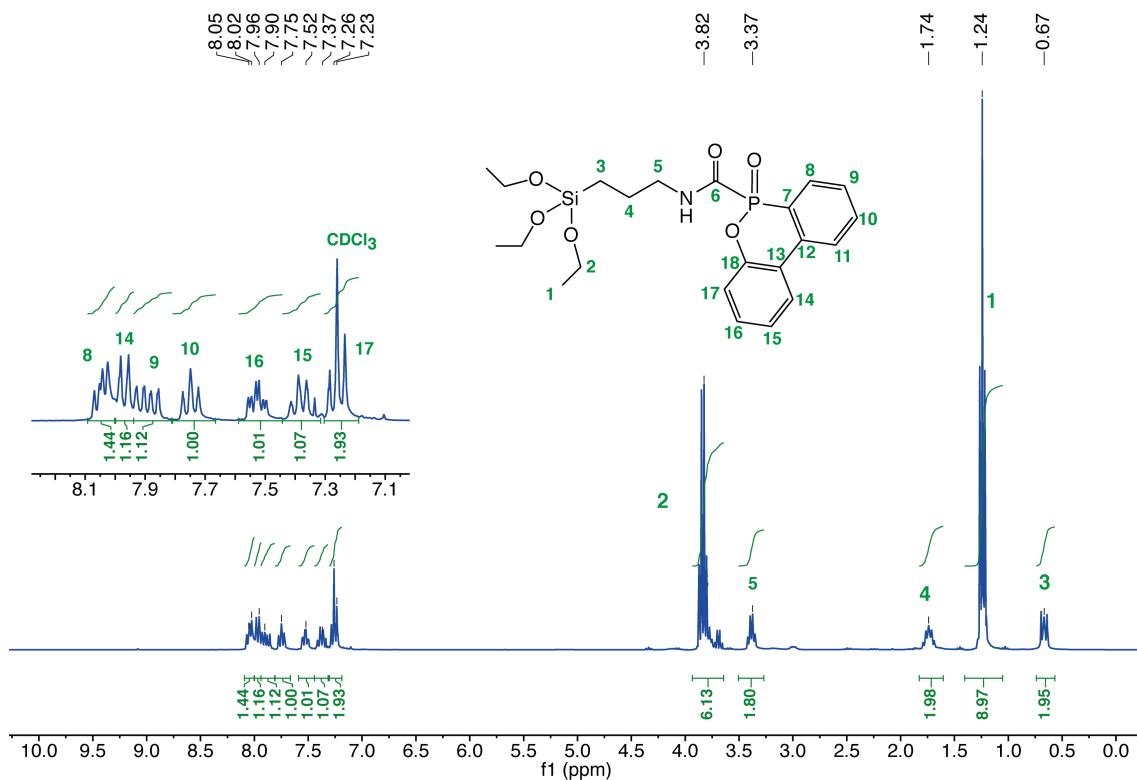


Fig. S6 ¹H-NMR spectrum of DOPO-AmdPTES

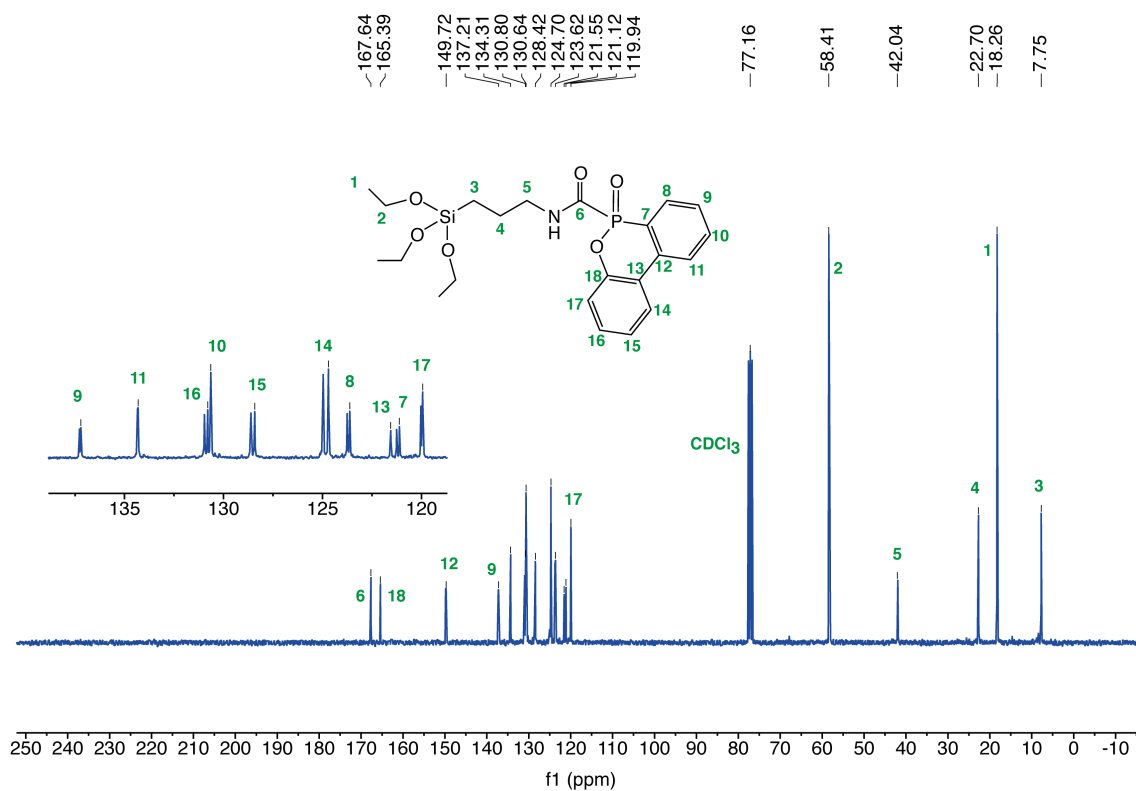


Fig. S7 ¹³C-NMR spectrum of DOPO-AmdPTES

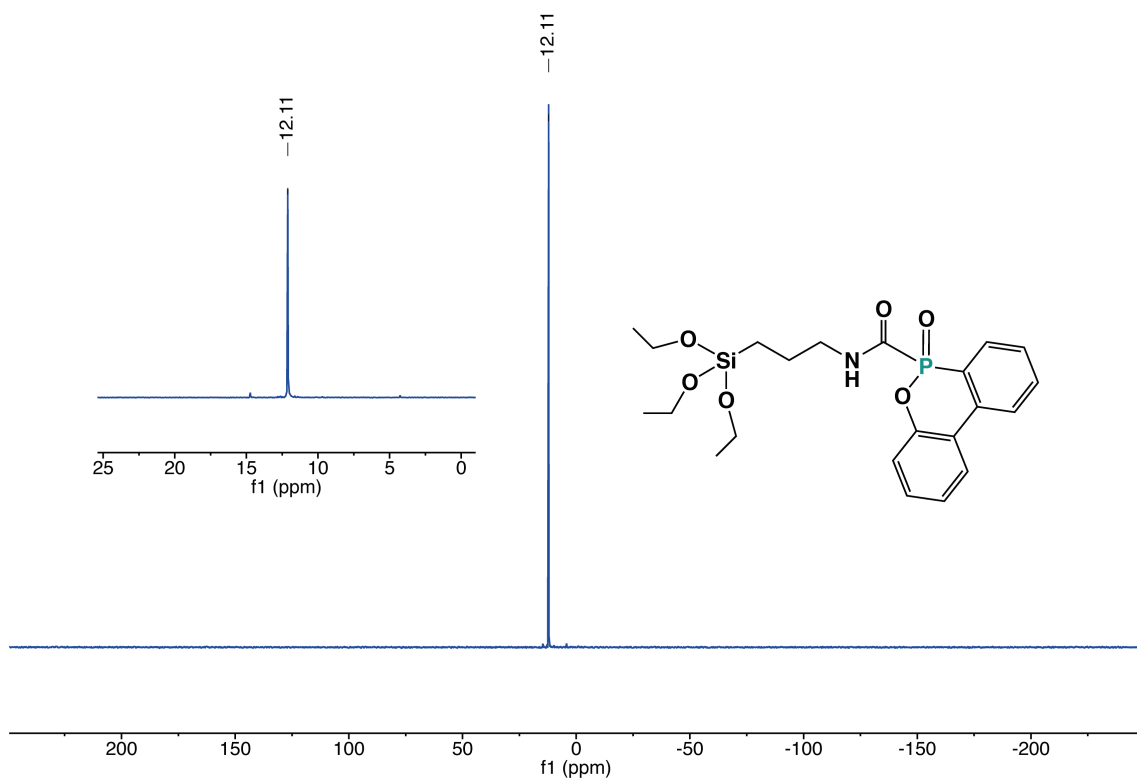


Fig. S8 Fig. S4: ^{31}P -NMR spectrum of DOPO-AmdPTES

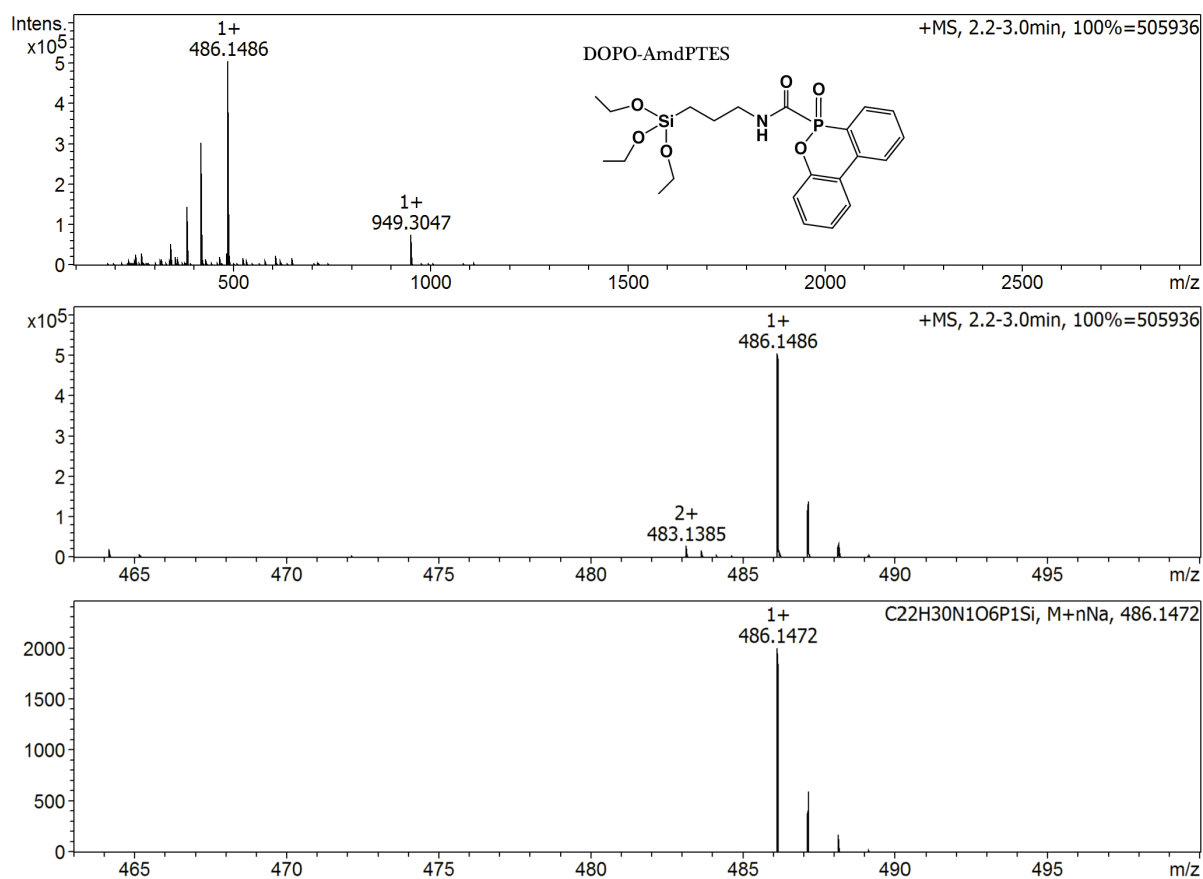










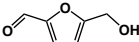

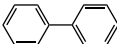

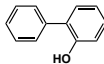
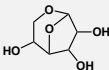

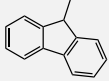
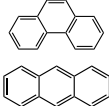
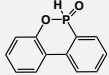
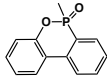
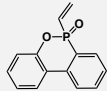
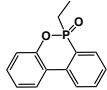
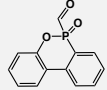


Fig. S9 High resolution MS spectrum of DOPO-AmdPTES

Table S1 Main identified pyrolysis products of untreated and treated cotton fabric obtained from Py-GC/MS at 700 °C

No.	Compound Name	Assigned structure	Molecular weight [g/mol]	Cotton (CO)		CO/DOPO-ETES		CO/DOPO-AmdPTES	
				Retention time	Relative Area	Retention time	Relative Area	Retention time	Relative Area
				[min]	[%]	[min]	[%]	[min]	[%]
1	CO ₂	O=C=O	44	0.6	4.6	0.6	2.6	0.4	3.7
2	Furan		68	1.5	2.4	1.5	1.7	1.3	0.7
3	Acetic acid ethenyl ester		86	2.6	0.7	–	–	–	–
4	Methylfuran		82	2.8	0.3	2.8	0.8	2.7	0.5
5	Acetic Acid		60	5.5	3.1	5.5	0.8	5.5	0.9
6	Hydroxyacetone		74	6.3	2.7	6.3	0.6	–	–
7	Triethylamine		101	–	–	–	–	6.7	0.7
8	2-Furfural		96	8.9	0.9	8.8	1.2	8.8	1.7
9	2-Furanmethanol		98	9.2	0.9	–	–	–	–
10	5-Methylfuran-2(3H)-one		98	10.4	1.5	10.4	0.9	10.4	0.3
11	Levoglucosenone		126	–	–	13.7	1.1	13.8	20

12	1,4:3,6-Dianhydro- α -d-glucopyranose		144	15.3	0.6	15.2	0.9	15.3	2.9
13	5-Hydroxymethylfurfural		126	15.4	2.3	15.4	3.6	15.3	2
14	2-Hydroxy-6,8-dioxabicyclo[3.2.1]octan-4-one		144	16.6	4.5	16.6	5.6	16.6	3.3
15	Biphenyl		154	–	–	17.9	0.4	17.9	1
16	Levogluconan		162	19.3	31.3	19.5	35.3	19.3	21.4
17	o-Hydroxybiphenyl		170	–	–	19.7	1.0	19.7	3.2
18	1,6-Anhydro- β -D-glucofuranose		162	–	–	20.5	2.21	20.4	2.1
19	1H-Phenylene		166	–	–	20.8	1.1	20.8	1.9
20	9-Methyl-9H-fluorene		180	–	–	21	0.6	21	0.3
21 22	Phenanthrene/ Anthracene		178	–	–	22.5 23.2	1 1.8	23.2	0.5
23	DOPO		216	–	–	–	–	27.2	0.5

24	Methyl-DOPO		230	-	-	27.7	1	27.7	1
25	Ethylene-DOPO		242	-	-	28.3	0.6	-	-
26	Ethyl-DOPO		244	-	-	28.6	4.1	-	-
27	Formyl-DOPO		244	-	-	-	-	28.6	0.5