

**Flame-retardant effect of tannic acid-based intumescent fire-retardant applied
on flammable natural rubber**

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Table S1 The batch compositions for ACT system.

Fire retardant	APP (g)	TC (g)	
		Clay (g)	TA (g)
APP20	20	--	--
APP40	40	--	--
APP60	60	--	--
ACT20	14.5	3.67	1.83
ACT40	29.1	7.27	3.63
ACT60	43.6	10.93	5.47

Table S2 TGA and DTG data of flame retardant APP and AGT under N₂ atmosphere.

Sample	T _{-5%} (°C)	T _{max} (°C)			Residue at 800 °C (%)
		T _{1max} (°C)	T _{2max} (°C)	T _{3max} (°C)	
APP	308.2	345.6	479.6	565.0	46.14
ACT	315.8	386.3	-	-	50.55

Table S3 SE value of flame retardant APP and ACT systems.

Samples	NR (phr)	APP (phr)	TC (phr)		LOI (%)	SE
			Clay (phr)	TA (phr)		
Neat NR	100	--	--	--	19.1	-
NR/APP14.5	100	14.5	--	--	20.0	1.08
NR/TC5.5	100	--	3.67	1.83	19.5	
NR/ACT20	100	14.5	3.67	1.83	20.5	
NR/APP29.1	100	29.1	--	--	23.0	1.84
NR/TC10.9	100	--	7.27	3.63	20.3	
NR/ACT40	100	29.1	7.27	3.63	28.5	
NR/APP43.6	100	43.6	--	--	25.1	1.44
NR/TC15.4	100	--	10.93	5.47	21.0	
NR/ACT60	100	43.6	10.93	5.47	30.5	