Supporting Information

Optimizing Synergistic Silica-Zinc Oxide Coating for Enhanced Flammability Resistance in Cotton Protective Clothing

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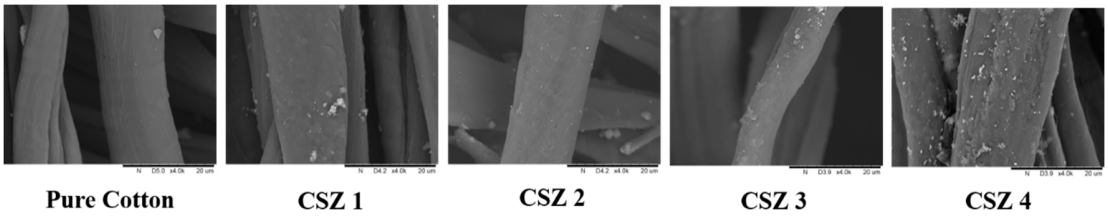

Figure S1: SEM images of Pure and Treated Cotton at Higher Magnification.

Table S1: Comparison of flammability properties of FR finished materials via Sol-gel.

Sr. No.	Additive	TGA in Nitrogen (T_{max} °C)	Time to Ignite (s)	Flame-Spread Time (s)	Weight Per unit Area (g/m²)	Ref.
01	TiO_2	346	--	--	98	[1]
02	SiO_2 (By Dipping)	--	22	--	200	[2]
03	SiO_2 (By vertical Spray)	--	30	--	200	[2]
04	MgO	422	--	--	117	[3]
05	SiO_2			13.6	139	[4]
06	boron-doped titania sol	346	10	2	180	[5]
07	phosphorous/nitrogen-based sol	310	34±2	48	273	[6]
08	0.25% SiO_2 + 0.25% ZnO	413	4	17	155	This Work
09	0.5% SiO_2 + 0.25% ZnO	428	5	21	155	
10	0.25% SiO_2 + 0.5% ZnO	420	5	19	155	

11	0.5% SiO_2 + 0.5% ZnO	428	6	20	155

The flame-retardant coatings having nanoparticles via sol-gel were compared with previous studies in Table S1. It was summarized that all coatings have good influence on flame-retardant properties. We found that the TGA of our samples were higher than the other coating materials reported in literature. It shows that these coating with the combination of silica and zinc nanoparticles effectively improved the flame-retardant properties. Similarly, the results of time to ignite were also comparable in this research work.

References

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