Supporting Information

The Cut-/Stab-Resistance of Protective Composite Textiles Reinforced with Particle Additives

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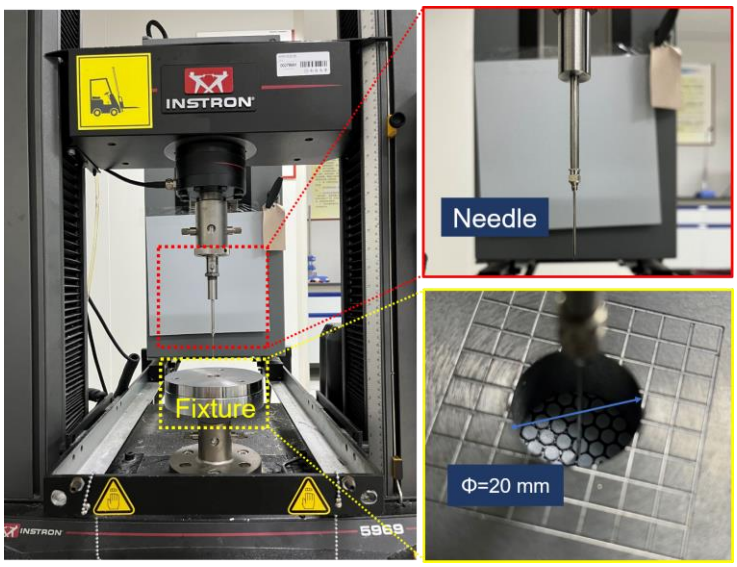

Figure. S1 Schematic of injection needle puncture.

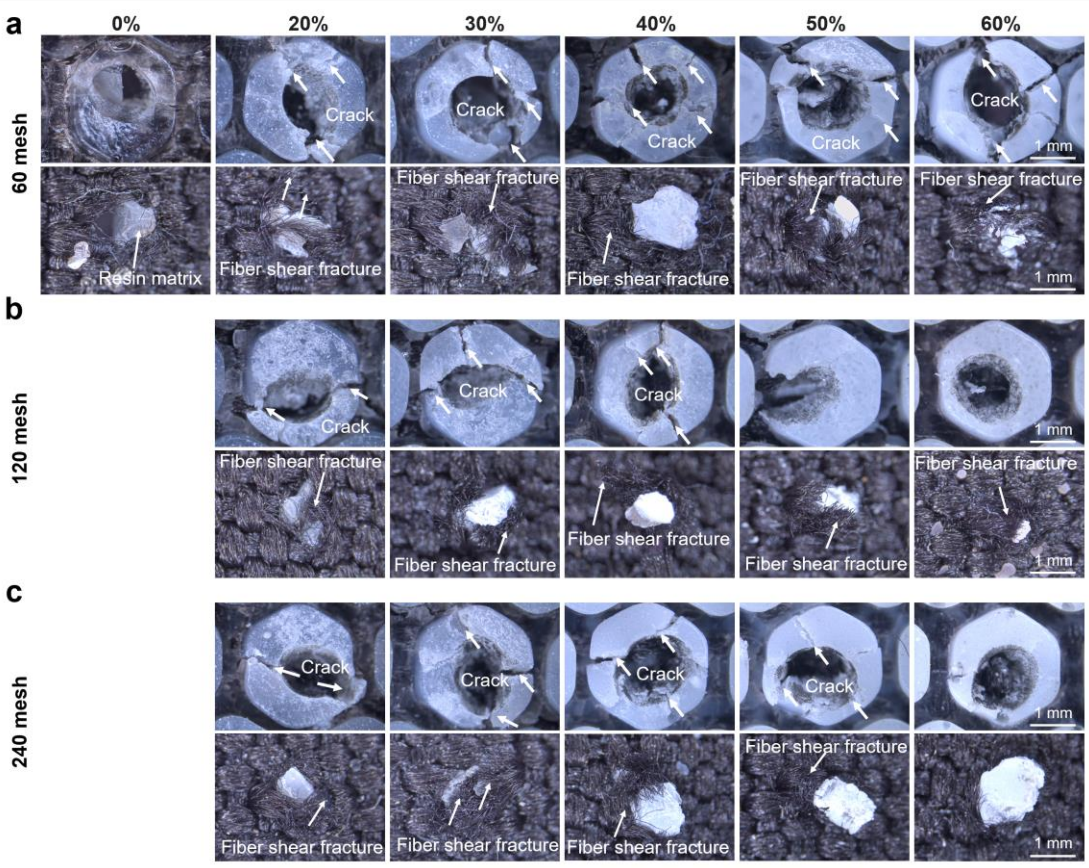

Figure. S2 Quasi-static puncture fracture morphology of SRUS textiles' resin surface.

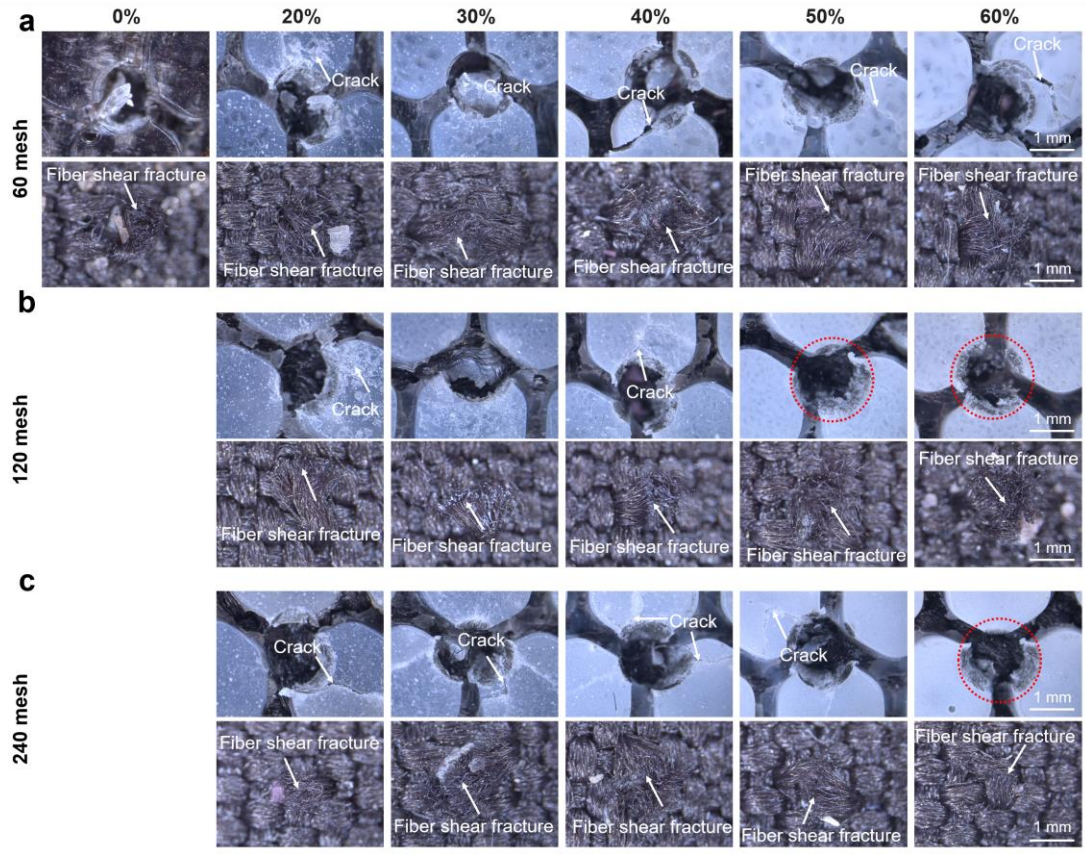

Figure. S3 Quasi-static puncture fracture morphology of composite textiles' gap.

Table S1 Component of the IP compound.

IP	Al_2O_3	SiO_2	$Ca_3Si_3O_9$	$BaSO_4$	TiO_2
wt.%	17.4	11.3	8.7	2.6	0.9

Table S2 Component of the epoxy/IP compound.

IP content (wt.%)	IP (g)	Dispersant (g)	Epoxy resin (g)	Curing agent (g)
0	0	0	48.0	12.0
20	47.0	8.0	176.0	44.0
30	47.0	8.0	102.7	25.7
40	47.0	8.0	66.0	16.5
50	47.0	8.0	44.0	11.0
60	47.0	8.0	29.3	7.3

Table S3 Specification of the SRUS textile.

Sample Code	Al_2O_3 （mesh）	IP content （wt.%）	Sample Code	Al_2O_3 （mesh）	IP content （wt.%）
60 mesh-10%	60	10	120 mesh-40%	120	40
60 mesh-20%	60	20	120 mesh-50%	120	50
60 mesh-30%	60	30	120 mesh-60%	120	60
60 mesh-40%	60	40	240 mesh-10%	240	10
60 mesh-50%	60	50	240 mesh-20%	240	20
60 mesh-60%	60	60	240 mesh-30%	240	30
120 mesh-0%	120	10	240 mesh-40%	240	40
120 mesh-20%	120	20	240 mesh-50%	240	50
120 mesh-30%	120	30	240 mesh-60%	240	60

Table S4 Performance comparison of cut resistance materials.

Type of material	Composition	Thickness (mm)	Area density (g m^{-2})	Cut resistance (gf)	Specific cut resistance (gf/g·m^{-2})	Ref.
2D Knitted textile	Aramid	1.17	364	1387	3.81	[43]
	UHMWPE/Glass/PET	1.02	492	408	1.35	[45]
	UHMWPE	1.13	367	663	1.11	[45]
	PBO/PET	1.06	524	2244	4.28	[45]
3D Knitted textile	HMWPE/PA	1.59	756	801	1.06	[16]
	Basalt/HMWPE/PA	1.59	700	4021	5.74	[16]
Woven textile	Glass	0.21	165	530	3.22	[43]
	Aramid	0.34	189	316	1.67	[43]
	Aramid/carbon	0.36	179	918	5.13	[43]
Continuously coated textile	Silicone-coated aramid	0.80	693	847	1.22	[43]
Dot-coated textile	Silicone-coated aramid	2.68	614	1153	1.88	[43]
Laminated textile	Aramid/Lycra/PU/Nylon	1.94	734	1030	1.40	[44]
Chain mail	304 stainless steel	3.00	3000	6000	2.00	
Crocodile skin		1.00-2.00	1000-2000	-	-	[46,47]
Previous work		1.01	867	5883	6.78	[41]
This work		1.01	867	6453	7.44	

Table S5 The comprehensive performance comparison of other protective materials.

Type of material	Composition	Price (dollars /kg)	Thickness (mm)	Specific cut resistance ($gf/g \cdot m^{-2}$)	Stab resistance (N)	Air permeability (mm/s)	Flexibility	Ref.
Dot-coated textile	Silicone-coated aramid	103±5	3.34	2.04	-	Yes	Medium	[43]
Laminated textile	Aramid/Lycra/PU/ Nylon	129±5	1.94	1.40	-	92	Medium	[44]
2D Knitted textile	PBO/PET	143±5	1.06	4.28	-	Yes	Good	[45]
3D Knitted textile	Basalt/HMWPE/PA	12.9±5	1.59	5.74	-	Yes	Medium	[16]
Metal material	TC4	87±5	1.20	>6.50	>30	NO	Poor	[4]
STF coating textile	Mylar/ STF/Aramid /Nylon	101±5	2.05	4.00	35.6 ± 3.3	NO	Medium	[49]
Previous work	IP/epoxy block/PET	4±2	1.01	6.78	38	60	Good	[41]
This work	IP/epoxy block/PET	4±2	1.01	7.44	44.1	60	Good	