Supplementary Materials

One step *in-situ* synthesis of zinc oxide nanoparticles for multifunctional cotton fabrics

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Table S1 Statistical analysis by t –test (effect of $Zn(NO_3)_2.6H_2O$ (M) on deposited amount of Zn Contents gram/kg)

	$Zn(NO_3)_2.6H_2O$ (M)	Zn contents(gram/kg)
Mean	0.283	3.349
Variance	0.031	2.245
Observations	9	9
Pearson Correlation	0.572	
Hypothesizes Mean Difference	0	
df	8	
t stat	-6.5416	
P(T<=t) one tail	0.00009	
t critical one tail	1.8595	
P(T<=t) two tail	0.00018	
t critical two tail	2.306	

Table S2 statistical analyses by t –test (effect of NaOH (M) on deposited amount of Zn Contents gram/kg)

	NaOH (M)	Zn contents(gram/kg)
Mean	0.283	3.349
Variance	0.031	2.245
Observations	9	9
Pearson Correlation	0.576	
Hypothesizes Mean Difference	0	
df	8	
t stat	-6.5453	
P(T<=t) one tail	0.00008	
t critical one tail	1.8595	
P(T<=t) two tail	0.00017	
t critical two tail	2.306	

Table S3 UPF value and protection category of the fabric categorized by The Australian standardization Institute[1]

UPF Value	Protection Level
Below 15	Not good
15-24	Good
24-39	Very good
40 and above	Excellent

Table S4 Statistical analysis by t –test (effect of Zn Contents gram/kg on UPF value)

	Zn contents(gram/kg)	UPF
Mean	3.01	63.529
Variance	3.11	1553.63
Observations	10	10
Pearson Correlation	0.98	
Hypothesizes Mean Difference	0	
df	9	
t stat	-5.078	
P(T<=t) one tail	0.00033	
t critical one tail	1.833	
P(T<=t) two tail	0.00066	
t critical two tail	2.262	

Table S5 Statistical analysis by t –test (effect of Zn Contents gram/kg on UVA Blocking%)

	Zn contents(gram/kg)	UVA Blocking%
Mean	3.01	93.64
Variance	3.11	54.46
Observations	10	10
Pearson Correlation	0.73	
Hypothesizes Mean Difference	0	
df	9	
t stat	-46.17	
P(T<=t) one tail	2.6×10^{-12}	

t critical one tail	1.833	
P(T<=t) two tail	5.2×10^{-12}	
t critical two tail	2.262	

Table S6 Statistical analysis by t –test (effect of Zn Contents gram/kg on UVB Blocking%)

	Zn contents(gram/kg)	UVB Blocking%
Mean	3.01	96.07
Variance	3.11	42.21
Observations	10	10
Pearson Correlation	0.72	
Hypothesizes Mean Difference	0	
df	9	
t stat	-54.82	
P(T<=t) one tail	5.6×10^{-13}	
t critical one tail	1.833	
P(T<=t) two tail	1.1×10^{-12}	
t critical two tail	2.262	

Table S7 Statistical analysis by t –test (effect of Zn Contents gram/kg on *S.aureus*(Reduction%)

	Zn contents(gram/kg)	*S.aureus*(Reduction%)
Mean	3.348	73.06
Variance	2.245	400.47
Observations	9	9
Pearson Correlation	0.95	
Hypothesizes Mean Difference	0	
df	8	
t stat	-11.25	
P(T<=t) one tail	1.7×10^{-6}	
t critical one tail	1.86	
P(T<=t) two tail	3.4×10^{-6}	
t critical two tail	2.31	

Table S8 Statistical analysis by t –test (effect of Zn Contents gram/kg on *E.coli* (Reduction%)

	Zn contents(gram/kg)	*E.coli*(Reduction%)
Mean	3.348	72.84
Variance	2.245	389.26
Observations	9	9
Pearson Correlation	0.94	
Hypothesizes Mean Difference	0	
df	8	
t stat	-11.37	
P(T<=t) one tail	1.6×10^{-6}	
t critical one tail	1.86	

P(T<=t) two tail	3.4×10^{-6}
t critical two tail	2.31

Table S9 Statistical analysis by t –test (effect of Zn Contents gram/kg on ΔE)

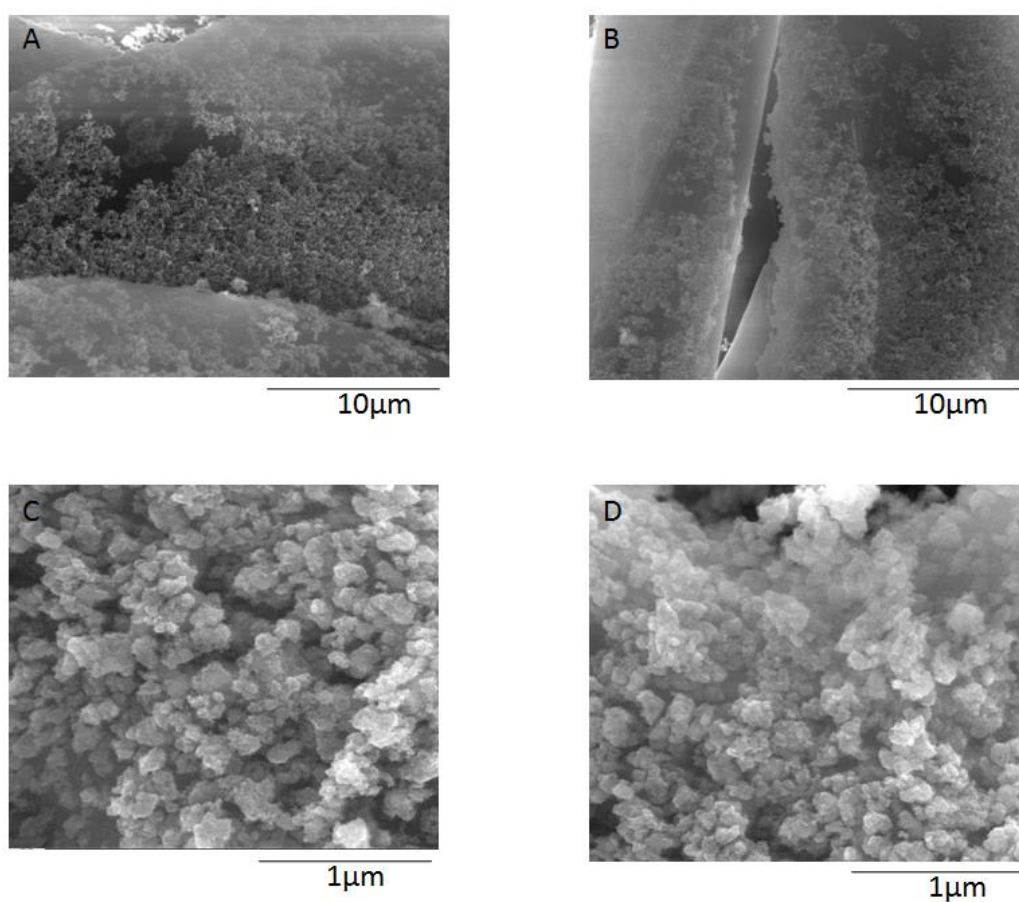|	Zn contents(gram/kg)	ΔE
Mean	3.01	55.61
Variance	3.11	576.99
Observations	10	10
Pearson Correlation	0.95	
Hypothesizes Mean Difference	0	
df	9	
t stat	-7.44	
P(T<=t) one tail	1.9×10^{-5}	
t critical one tail	1.833	
P(T<=t) two tail	3.9×10^{-5}	
t critical two tail	2.26	

Figure S1 SEM Images A and C Zn contents 4.671 gram/kg (Sample9). B and D Zn contents 4.021 gram/kg (sample 8)

References

1.   Gies, P.; Slevin, T.; Harrison, S.; Plowman, P.; Dain, S.; Moller, L.; Mawley, F.; Swift, N. *Australian/New Zealand Standard, AS/NZS 4399: 2017: Sun Protective Clothing–Evaluation and Classification*; Standards Australia, 2017; ISBN 1760358843.