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Supplementary Materials: Comparative Analysis of Performance of Water-Based Coatings Prepared by Two Kinds of Anti-Bacterial Microcapsules and Nano-Silver Solution on the Surface of Andoung Wood

Yuming Zou [1,2], Pan Pan [1,2] and Xiaoxing Yan [1,2,*]

[1] Co-Innovation Center of Efficient Processing and Utilization of Forest Resources, Nanjing Forestry University, Nanjing 210037, China; zou_yuming@njfu.edu.cn (Y.Z.), pan@njfu.edu.cn (P.P.)
[2] College of Furnishings and Industrial Design, Nanjing Forestry University, Nanjing 210037, China
* Correspondence: yanxiaoxing@njfu.edu.cn

The materials for the test are shown in Table S1.

Table S1. List of experimental material information.

Material	Manufacturer
Andoung wood	Guangdong Yihua Wood Industry Co., Ltd., Shantou, China
Nano-silver solution	Tianjin Beichen Founder Reagent Factory, Tianjin, China
Urea	Fuchen Chemical Reagent Co., Ltd., Tianjin, China
37.0% formaldehyde	Nantong Yaoxin Chemical Co., Ltd., Nantong, China
Triethanolamine	Shaanxi Panlong Yihai Pharmaceutical Co., Ltd., Xi'an, China
Citric acid monohydrate	Nanjing Quanlong Biotechnology Co., Ltd., Nanjing, China
Tween-80	Wuxi Yatai United Chemical Co., Ltd., Wuxi, China
Span-80	Shandong Zibo Haijie Chemical Co., Ltd., Zibo, China
Absolute ethanol	Guangzhou Kema Chemical Technology Co., Ltd., Guangzhou, China
Chitosan	Shanghai National Medicine Reagent Co., Ltd., Shanghai, China
Acetic acid	Shanghai National Medicine Reagent Co., Ltd., Shanghai, China
Melamine	Shandong Yousuo Chemical Industry Technology Co., Ltd., Linyi, China
Nutrient Agar	Qingdao Hope Bio-Technology Co., Ltd., Qingdao, China
Nutritious Broth	Qingdao Hope Bio-Technology Co., Ltd., Qingdao, China
Water-based primer	Akzo Nobel Paint Co., Ltd., Guangzhou, China
Water-based top coat	Akzo Nobel Paint Co., Ltd., Guangzhou, China
Staphylococcus aureus	Beijing Conservation Biotechnology Co., Ltd., Beijing, China
Escherichia coli	Beijing Conservation Biotechnology Co., Ltd., Beijing, China
Eluent	Sichuan Kelun Pharmaceutical Co., Ltd., Chengdu, China
Red ink	Guangzhou Hero Hailuo Cultural Products Co., Ltd., Guangzhou, China
Ethanol (medical grade)	Shandong Elimokang Medical Supplies Co., Ltd., Qingdao, China

The results of tests were assessed in terms of the statistical significance of the difference concerning the kinds of antibacterial agents for the coating, aging time for the coating, or aging method for the coating, respectively. The non-repeated two-way ANOVA method was used for significance analysis. The analysis of variance at a significance level of 0.05 was performed to detect significant differences in coating properties.

In Tables S2–S17, SS is the sum of squares from the mean square, representing the sum of squares between groups and within groups; d_f is the degree of freedom, and MS is the mean square obtained by dividing the sum of squares by the degrees of freedom. F represents the test statistic, which is used to calculate the hypothesis test. P_{value} indicates the level of significance, which is used to evaluate the range and interval of overall parameters and calculate the probability of a possible experiment. F_{crit} represents the F value at the corresponding significant level. When F is less than F_{crit}, there is no difference between the two groups of data. The criterion for judging the significance of the difference is that if $0.01 < P_{value} < 0.05$, the difference is significant. If $P_{value} \leq 0.01$, the difference is very significant. If $P_{value} > 0.05$, there is no difference. The results obtained by the above methods are $F > F_{crit}$ and $P_{value} < 0.01$.

As shown in Table S2, there is a significant difference for the anti-bacterial properties toward the *Staphylococcus aureus* of the coating. As shown in Table S3, it shows no difference for the anti-bacterial properties toward the *Escherichia coli* of the coating. As shown in Tables S4-S6, it shows a significant difference for the coating gloss. As shown in Table S7, it shows a significant difference for the coating adhesion. As shown in Tables S8-S10, after high-temperature accelerated aging, there is only a significant difference for the chromatic aberration of the coating with CS-AgNPS@MF. As shown in Tables S11-S13, for the liquid resistance of the coating, there is a significant difference for the red ink. After liquid resistance and high-temperature accelerated aging, the chromatic aberration of the coating shows no difference, as shown in Table S14. For the anti-bacterial property toward *Escherichia coli*, three kinds of anti-bacterial coating after high-temperature accelerated aging show a significant difference, as shown in Table S15. For the anti-bacterial property toward *Staphylococcus aureus*, three kinds of the anti-bacterial coating after high-temperature accelerated aging show a significant difference, as shown in Table S16. As shown in Table S17, there is a significant difference for the anti-bacterial properties toward *Escherichia coli* of the coating with AgNPS@UF before aging, after high-temperature accelerated aging, and after UV aging, respectively.

Table S2. Significance analysis of anti-bacterial properties toward the *Staphylococcus aureus* of the coating.

Difference source	SS	d_f	MS	F	P_{value}	F_{crit}
content	0.0217387	6	0.003623117	0.756944348	0.616584552	2.996120378
anti-bacterial agent	0.211701548	2	0.105850774	22.11442626	0.000094	3.885293835
error	0.057438039	12	0.004786503			
total	0.290878287	20				

Table S3. Significance analysis of anti-bacterial properties toward the *Escherichia coli* of the coating.

Difference source	SS	d_f	MS	F	P_{value}	F_{crit}
content	0.005224871	6	0.000870812	0.686196613	0.664909433	2.996120378
anti-bacterial agent	0.005595313	2	0.002797657	2.204543351	0.152961107	3.885293835
error	0.015228496	12	0.001269041			
total	0.026048681	20				

Table S4. Significance analysis of 20° gloss of anti-bacterial coatings.

Difference source	SS	d_f	MS	F	P_{value}	F_{crit}
content	287.07625	7	41.01089286	7.943449087	0.000556157	2.764199257
anti-bacterial agent	170.4133333	2	85.20666667	16.50378159	0.000207837	3.738891832
error	72.28	14	5.162857143			
total	529.7695833	23				

Table S5. Significance analysis of 60° gloss of anti-bacterial coatings.

Difference source	SS	d_f	MS	F	P_{value}	F_{crit}
content	516.5783333	7	73.79690476	5.327907107	0.003869813	2.764199257
anti-bacterial agent	950.0258333	2	475.0129167	34.29445588	0.000004	3.738891832
error	193.9141667	14	13.8510119			
total	1660.518333	23				

Table S6. Significance analysis of 85° gloss of anti-bacterial coatings.

Difference source	SS	d_f	MS	F	P_{value}	F_{crit}
content	1165.178333	7	166.4540476	2.132924306	0.107875718	2.764199257
anti-bacterial agent	3032.655833	2	1516.327917	19.43006322	0.000091	3.738891832
error	1092.564167	14	78.04029762			
total	5290.398333	23				

Table S7. Significance analysis of the coating adhesion.

Difference source	SS	d_f	MS	F	P_{value}	F_{crit}
content	15.29166667	7	2.18452381	5.734375	0.002761596	2.764199257
anti-bacterial agent	28	2	14	36.75	0.000003	3.738891832
error	5.333333333	14	0.380952381			
total	48.625	23				

Table S8. Significance analysis of chromatic aberration of the coating after high-temperature accelerated aging with AgNPS@UF.

Difference source	SS	d_f	MS	F	P_{value}	F_{crit}
content	188.4908903	6	31.41514839	16.30361784	0.000039156	2.996120378
aging time	13.01592444	2	6.507962222	3.377457515	0.068611493	3.885293835
error	23.12258446	12	1.926882039			
total	224.6293992	20				

Table S9. Significance analysis of chromatic aberration of the coating after high-temperature accelerated aging with CS-AgNPS@MF.

Difference source	SS	d_f	MS	F	P_{value}	F_{crit}
content	105.082072	6	17.51367866	1.493808968	0.260536476	2.996120378
aging time	492.4579029	2	246.2289515	21.00181366	0.000120379	3.885293835
error	140.6901073	12	11.72417561			
total	738.2300822	20				

Table S10. Significance analysis of chromatic aberration of the coating after high-temperature accelerated aging with nano-silver solution.

Difference source	SS	d_f	MS	F	P_{value}	F_{crit}
content	17.58152731	6	2.930254551	3.075692139	0.046213065	2.996120378
aging time	6.414448243	2	3.207224121	3.366408565	0.069098547	3.885293835
error	11.4325664	12	0.952713867			
total	35.42854195	20				

Table S11. Significance analysis of liquid resistance toward red ink of the coating.

Difference source	SS	d_f	MS	F	P_{value}	F_{crit}
content	13.33333333	7	1.904761905	5.423728814	0.003568945	2.764199257
anti-bacterial agent	25.08333333	2	12.54166667	35.71186441	0.000003	3.738891832
error	4.916666667	14	0.351190476			
total	43.33333333	23				

Table S12. Significance analysis of liquid resistance toward detergent of the coating.

Difference source	SS	d_f	MS	F	P_{value}	F_{crit}
content	14.95833333	7	2.136904762	8.756097561	0.000333927	2.764199257
anti-bacterial agent	0.583333333	2	0.291666667	1.195121951	0.331740378	3.738891832
error	3.416666667	14	0.244047619			
total	18.95833333	23				

Table S13. Significance analysis of liquid resistance toward ethanol of the coating.

Difference source	SS	d_f	MS	F	P_{value}	F_{crit}
content	0	7	0	65535	DBZ	2.764199257
anti-bacterial agent	0	2	0	65535	DBZ	3.738891832
error	0	14	0			
total	0	23				

Table S14. Significance analysis of chromatic aberration of the coating after liquid resistance and after high-temperature accelerated aging.

Difference source	SS	d_f	MS	F	P_{value}	F_{crit}
content	409.170352	6	68.19505866	5.259303025	0.007158934	2.996120378
anti-bacterial agent	10.6993312	2	5.349665598	0.412574064	0.670985504	3.885293835
error	155.5986982	12	12.96655818			
total	575.4683813	20				

Table S15. Significance analysis of the anti-bacterial property toward *Escherichia coli* of the coating after high-temperature accelerated aging.

Difference source	SS	d_f	MS	F	P_{value}	F_{crit}
content	0.026522906	6	0.004420484	1.669758182	0.211660735	2.996120378
anti-bacterial agent	0.465923032	2	0.232961516	87.99700838	0.00000007	3.885293835
error	0.031768559	12	0.00264738			
total	0.524214498	20				

Table S16. Significance analysis of the anti-bacterial property toward *Staphylococcus aureus* of the coating after high-temperature accelerated aging.

Difference source	SS	d_f	MS	F	P_{value}	F_{crit}
content	0.035792943	6	0.00596549	0.563313234	0.751919636	2.996120378
anti-bacterial agent	0.438139327	2	0.219069663	20.68645355	0.00012917	3.885293835
error	0.12708007	12	0.010590006			
total	0.601012339	20				

Table S17. Significance analysis of the anti-bacterial properties toward *Escherichia coli* of the coating with AgNPS@UF before aging, after the high-temperature accelerated aging, and after the UV aging.

Difference source	SS	d_f	MS	F	P_{value}	F_{crit}
content	0.014758411	6	0.002459735	3.31277359	0.03673298	2.996120378
aging method	0.295169814	2	0.147584907	198.7674846	0.0000000006	3.885293835
error	0.008910003	12	0.0007425			
total	0.318838228	20				