Purification of Gold Nanoplates Grown Directly on Surfaces for Enhanced Localized Surface Plasmon Resonance Biosensing

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SUPPORTING INFORMATION

Table S1. AFM and combined AFM and SEM analysis of the average width, height, and aspect ratio of Au nanoplates synthesized by growth solution 1 and 2 before and after taping and sonication.

	Growth solution 1						Growth solution 2					
	Before		After Taping		After Sonication		Before		After Taping		After Sonication	
	AFM	SEM + AFM	AFM	SEM + AFM	AFM	SEM + AFM	AFM	SEM + AFM	AFM	SEM + AFM	AFM	SEM + AFM
# of Samples	3	3	4	3	3	3	2	3	2	3	2	3
# of Plates	46	141	43	73	41	55	16	122	23	97	18	108
Average Length	203 ± 50	163 ± 46	183 ± 41	153 ± 33	269 ± 54	182 ± 49	214 ± 46	184 ± 43	216 ± 45	179 ± 34	202 ± 54	187 ± 48
Average Height	37 ±12	37 ±12	29 ±5	29 ±5	28 ±6	28 ±6	31 ±5	31 ±5	32 ±10	32 ±10	27 ±8	27 ±8
Average Aspect ratio	6.1 ± 2.5	4.4 ± 1.9	6.4 ± 2.1	5.3 ± 1.4	9.7 ± 2.6	6.5 ± 2.3	7.1 ± 2.1	5.9 ± 1.7	7.5 ± 2.8	5.6 ± 2.1	8.1 ± 2.7	6.9 ± 2.6

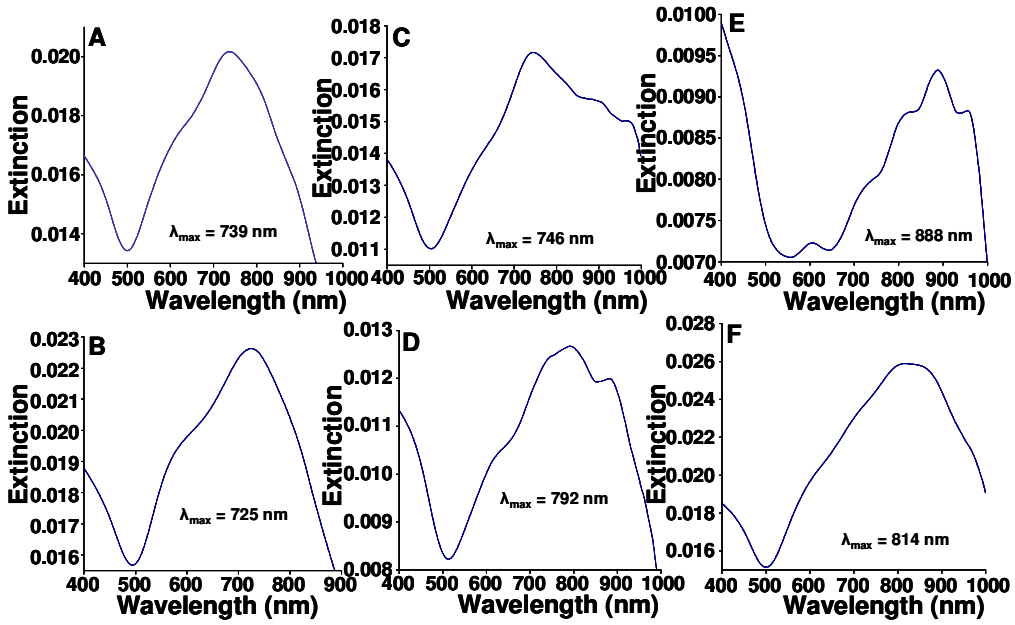

Figure S1. LSPR spectra of Au nanostructures synthesized by seed-mediated growth and then sonicated in water for 5 min. The λ_{max} values are more red-shifted compared to taped samples and the spectra often exhibit multiple peaks, which we attribute to different nanoplate populations.

Table S2. The wavelength of maximum extinction (λ_{max}) and extinction of Au nanostructures synthesized by growth solution 1 before and after purification by tape and sonication.

Growth solution 1												
Sample	Before taping		After taping				Before sonication		After sonication			
			Peak 1		Peak 2				Peak 1		Peak 2	
	λ_{max}	Abs	λ_{max}	Abs	λ_{max}	Abs	λ_{max}	Abs	λ_{max}	Abs	λ_{max}	Abs
1	548	0.139	672	0.020	888	0.016	548	0.114	789	0.035		
2	541	0.128	678	0.016	778	0.015	570	0.154	858	0.035		
3	558	0.096	647	0.064			542	0.113	739	0.020		
4	550	0.083	674	0.009			551	0.112	792	0.013	882	0.012
5	554	0.139	694	0.009			539	0.142	725	0.023		
6	543	0.140	668	0.045			543	0.129	814	0.026		
7							547	0.116	746	0.017	880	0.016
Avg	549	0.121	672	0.027	833	0.016	548	0.126	780	0.024	881	0.014
Std. Dev.	6	0.025	15	0.022	77	0.001	10	0.017	47	0.008	1	0.003

Table S3. The wavelength of maximum extinction (λ_{max}) and extinction of Au nanostructures synthesized by growth solution 2 before and after purification by tape and sonication.

Growth solution 2												
Sample	Before taping		After taping				Before sonication		After sonication			
			Peak 1		Peak 2				Peak 1		Peak 2	
	λ_{max}	Abs	λ_{max}	Abs	λ_{max}	Abs	λ_{max}	Abs	λ_{max}	Abs	λ_{max}	Abs
1	615	0.155	643	0.082			607	0.168	701	0.018		
2	625	0.119	689	0.054			620	0.149	717	0.012		
3	641	0.128	660	0.068			627	0.157	722	0.012		
4							637	0.110	739	0.011		
5							643	0.131	722	0.012		
6							635	0.129	722	0.003	840	0.003
Avg	627	0.134	664	0.068			628	0.141	720	0.011		
Std. Dev.	13	0.019	23	0.014			13	0.021	12	0.005		

Table S4. AFM analysis of the aspect ratio of Au nanostructures synthesized by growth solution 1 before and after sonication for various times.

Growth solution 1										
Sample	1			2			3			
Sonication time (secs)	0	15	55	0	15	55	0	20	55	105
Average Aspect ratio	5.9 ± 2.4	5.8 ± 2.4	10.2 ± 2.8	5.6 ± 2.0	6.1 ± 2.6	9.3 ± 2.0	6.9 ± 3.0	5.8 ± 2.5	9.1 ± 2.6	9.6 ± 2.9
Average length	207 ± 40	205 ± 43	277 ± 47	192 ± 39	191 ± 75	287 ± 57	214 ± 70	210 ± 43	247 ± 71	246 ± 54
Average height	39 ± 14	38 ± 9	28 ± 6	38 ± 13	32 ± 7	31 ± 6	33 ± 8	42 ± 16	27 ± 5	27 ± 6

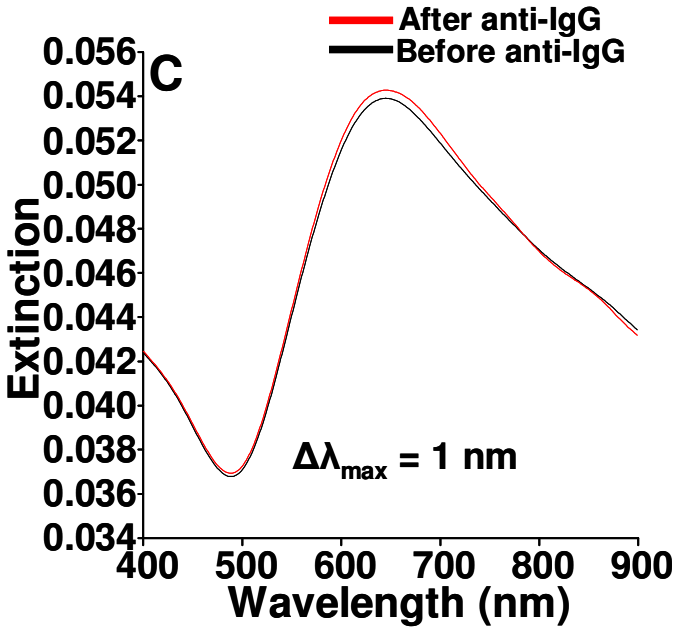

Figure S2. LSPR spectra of a taped sample of Au nanoplates functionalized with mercaptoethanol (ME) and exposed to 0.26 μg/mL human anti-IgG. The small shift in λ_{max} indicates little or no anti-IgG binding on the surface and the nearly identical LSPR spectrum before and after anti-IgG exposure confirms that we were able to successfully obtain the spectrum in the same region of the sample before and after anti-IgG exposure.

Refractive Index (RI) Sensitivity Measurements

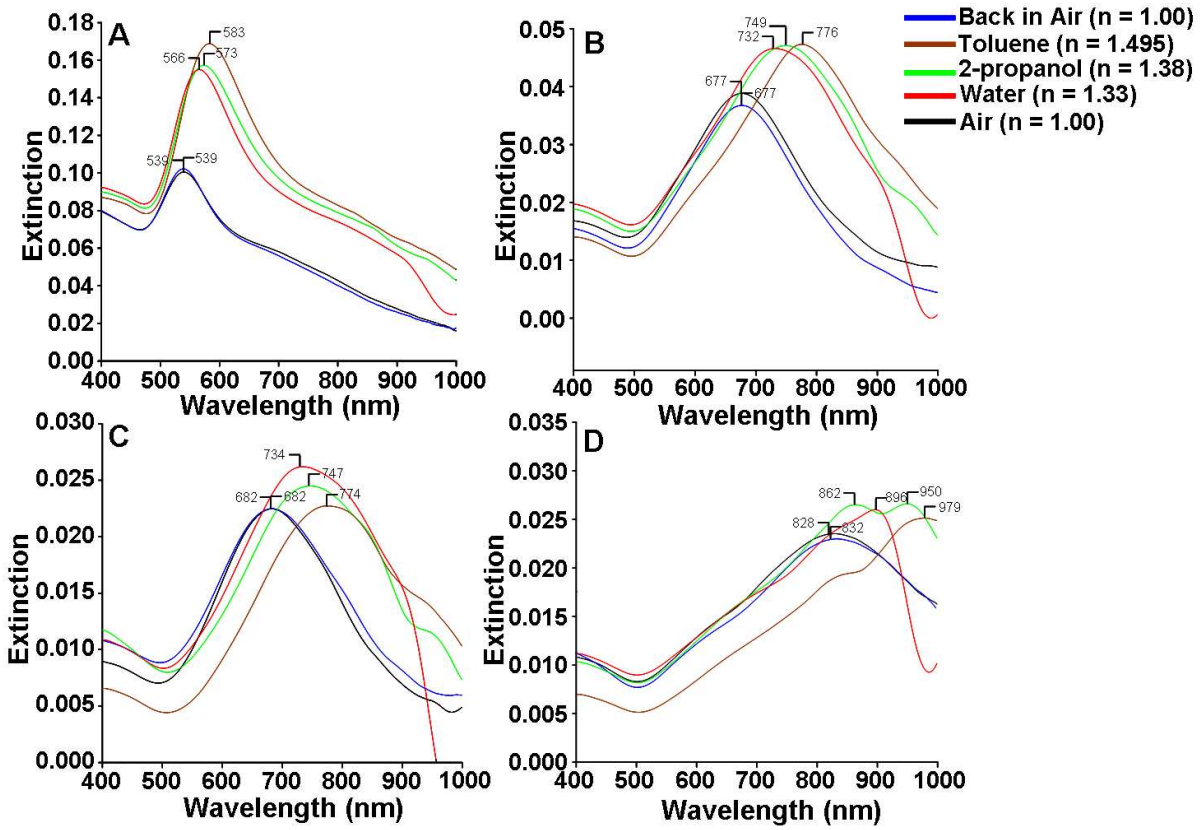

Figure S3. LSPR spectra of samples synthesized by GS1 and (A) not purified or (B-D) purified by sonication. We exposed the sample to solvents of increased refractive index following the order air, water, 2-propanol, toluene and back in air, respectively.

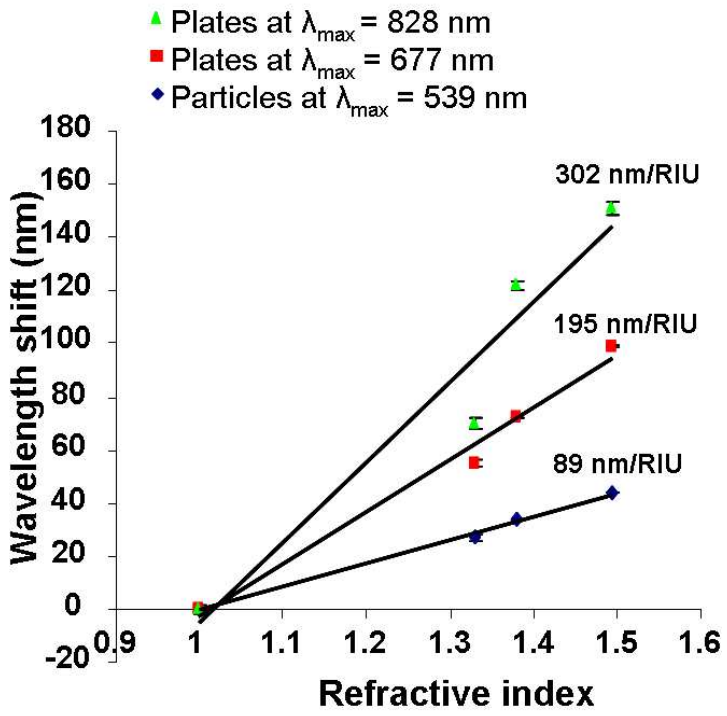

Figure S4. Plot of refractive index vs wavelength shift for spherical Au particles with a λ_{max} of 539 nm and nanoplates with a λ_{max} of 677 nm and 793 nm as indicated.