Electronic Supplementary Information

Comparison of the plasmonic performances between lithographically fabricated and chemically grown gold nanorods

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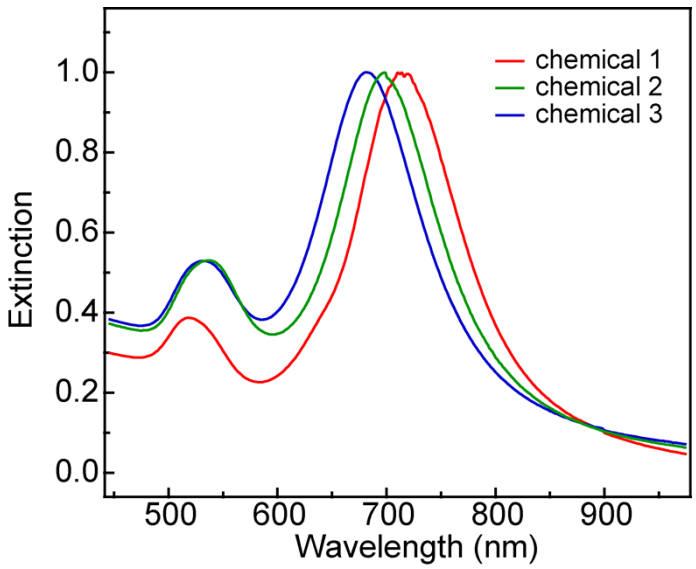

Fig. S1 Measured extinction spectra of the three chemical Au nanorod samples in aqueous solutions.

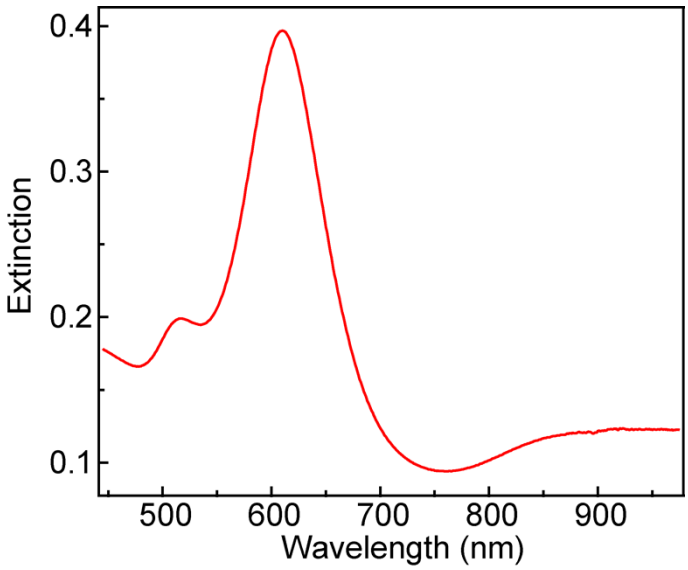

Fig. S2 Measured extinction spectrum of the chemical Au nanorods deposited on cover glass slides.

Table S1 Measured lengths, diameters, LLSPWs, scattering peak intensities and FWHM values in both wavelength and energy for the individual chemical Au nanorods

number[a]	length (nm)[b]	diameter (nm)[c]	LLSPW (nm)[d]	peak intensity (counts)[e]	FWHM (nm)[f]	FWHM (meV)[g]
1	98	44	717	14212	48	116
2	104	43	700	15059	51	129
3	96	43	673	12142	44	120
4	88	41	680	10417	44	118
5	121	57	707	27384	70	174
6	85	42	706	11794	48	119
7	101	53	660	12901	58	165
8	98	63	647	16116	67	198
9	80	70	630	19705	72	225
10	99	57	651	14102	65	190
11	89	42	732	10600	50	116
12	92	44	689	13283	45	118
13	118	55	706	26427	78	194
14	90	42	671	10761	44	122
15	101	43	723	13843	51	121
16	109	51	693	20163	66	170
17	107	52	693	22481	59	152
18	87	41	692	10408	45	117
19	117	56	685	22111	71	188

[a]Nineteen chemical Au nanorods were measured by SEM imaging and dark-field scattering spectroscopy. [b,c]The lengths and diameters were measured on SEM images. [d–g]LLSPW refers to the longitudinal localized surface plasmon wavelength of the Au nanorod. FWHM refers to the full width at half maximum. The LLSPWs, peak intensities and FWHM values of the longitudinal plasmon resonance mode were extracted from the single-particle scattering spectra of the Au nanorods. The FWHM values in wavelength and energy were obtained by Lorentzian-fitting the plot of the scattering intensity *versus* wavelength and the plot of the scattering intensity *versus* energy, respectively.

Table S2 Measured lengths (nm) of the individual EBL-fabricated Au nanorods with different designed lengths and widths

	60[a]	70	80	90	100	110	120
40[b]	60 ± 3	68 ± 3	79 ± 2	88 ± 4	95 ± 4	106 ± 2	119 ± 4
45	60 ± 3	68 ± 3	81 ± 3	88 ± 4	98 ± 4	109 ± 4	117 ± 3
50	65 ± 4	70 ± 4	81 ± 3	93 ± 3	100 ± 4	110 ± 2	119 ± 3
55	65 ± 3	74 ± 2	81 ± 2	94 ± 3	102 ± 4	111 ± 3	122 ± 3
60	69 ± 2	78 ± 4	84 ± 3	95 ± 3	105 ± 3	115 ± 4	124 ± 3

[a]In the topmost row are the designed lengths (nm) of the Au nanorods in the EBL fabrication. [b]In the leftmost column are the designed widths (nm) of the Au nanorods in the EBL fabrication. The actual sizes of the Au nanorods were measured from the SEM images. This is also applicable for Tables S3–S6.

Table S3 Measured widths (nm) of the individual EBL-fabricated Au nanorods with different designed lengths and widths

	60	70	80	90	100	110	120
40	40 ± 3	40 ± 3	42 ± 2	41 ± 2	43 ± 2	41 ± 2	41 ± 2
45	42 ± 2	44 ± 2	43 ± 2	40 ± 2	43 ± 3	44 ± 2	42 ± 2
50	46 ± 2	46 ± 2	48 ± 2	48 ± 2	50 ± 2	50 ± 2	48 ± 2
55	55 ± 2	59 ± 3	56 ± 3	57 ± 3	56 ± 5	56 ± 4	56 ± 2
60	60 ± 3	64 ± 3	59 ± 4	58 ± 4	61 ± 4	59 ± 3	60 ± 4

Table S4 LLSPWs (nm) of the individual EBL-fabricated Au nanorods with different designed lengths and widths[a]

	60	70	80	90	100	110	120
40		616 ± 15	658 ± 13	680 ± 21	716 ± 12	774 ± 21	834 ± 19
45	604 ± 12	612 ± 17	667 ± 17	705 ± 13	714 ± 22	760 ± 13	795 ± 19
50	588 ± 16	596 ± 22	628 ± 11	682 ± 15	695 ± 16	753 ± 20	786 ± 13
55	579 ± 10	594 ± 16	634 ± 13	673 ± 11	685 ± 7	729 ± 18	784 ± 17
60	583 ± 9	595 ± 10	629 ± 14	661 ± 12	682 ± 14	730 ± 11	765 ± 17

[a]The LLSPWs of the Au nanorods were obtained from their single-particle scattering spectra. The empty cell is because the scattering signal of the corresponding Au nanorods was too weak to be measured. This is also applicable for the empty cells in Tables S5–S7.

Table S5 Peak intensities (counts) of the longitudinal plasmon resonance peak of the individual EBL-fabricated Au nanorods with different designed lengths and widths

	60	70	80	90	100	110	120
40		578 ± 173	818 ± 93	1712 ± 292	2353 ± 335	3123 ± 320	5925 ± 767
45	747 ± 219	812 ± 344	1101 ± 219	2213 ± 338	3051 ± 612	3725 ± 546	6152 ± 776
50	1178 ± 229	1396 ± 373	1583 ± 227	2538 ± 421	3950 ± 904	5430 ± 1027	7651 ± 585
55	1348 ± 271	1895 ± 663	2871 ± 639	2656 ± 451	4505 ± 487	5517 ± 706	8897 ± 1186
60	1815 ± 478	2051 ± 527	2609 ± 724	3816 ± 412	5097 ± 844	6183 ± 776	8835 ± 1247

Table S6 FWHM values (nm) of the longitudinal plasmon resonance peak of the individual EBL-fabricated Au nanorods with different designed lengths and widths

	60	70	80	90	100	110	120
40		123 ± 42	90 ± 26	76 ± 13	78 ± 13	87 ± 12	95 ± 8
45	132 ± 64	155 ± 57	80 ± 16	91 ± 9	87 ± 10	81 ± 14	80 ± 12
50	134 ± 44	139 ± 45	102 ± 31	82 ± 10	92 ± 11	89 ± 10	95 ± 7
55	129 ± 51	113 ± 15	101 ± 14	76 ± 12	87 ± 6	82 ± 6	106 ± 7
60	88 ± 26	94 ± 18	107 ± 25	80 ± 11	88 ± 10	94 ± 4	97 ± 9

Table S7 FWHM values (meV) of the longitudinal plasmon resonance peak of the individual EBL-fabricated Au nanorods with different designed lengths and widths

	60	70	80	90	100	110	120
40		406 ± 137	259 ± 75	204 ± 35	189 ± 32	181 ± 25	170 ± 15
45	454 ± 218	522 ± 189	224 ± 45	228 ± 23	212 ± 25	174 ± 31	157 ± 24
50	487 ± 158	492 ± 157	323 ± 98	219 ± 27	237 ± 29	195 ± 22	191 ± 15
55	483 ± 189	401 ± 53	314 ± 44	209 ± 33	231 ± 16	192 ± 14	215 ± 15
60	323 ± 95	331 ± 64	338 ± 79	228 ± 32	236 ± 27	220 ± 10	206 ± 20