Electronic Supplementary Information

Plasmonic and sensing properties of vertically oriented hexagonal gold nanoplates

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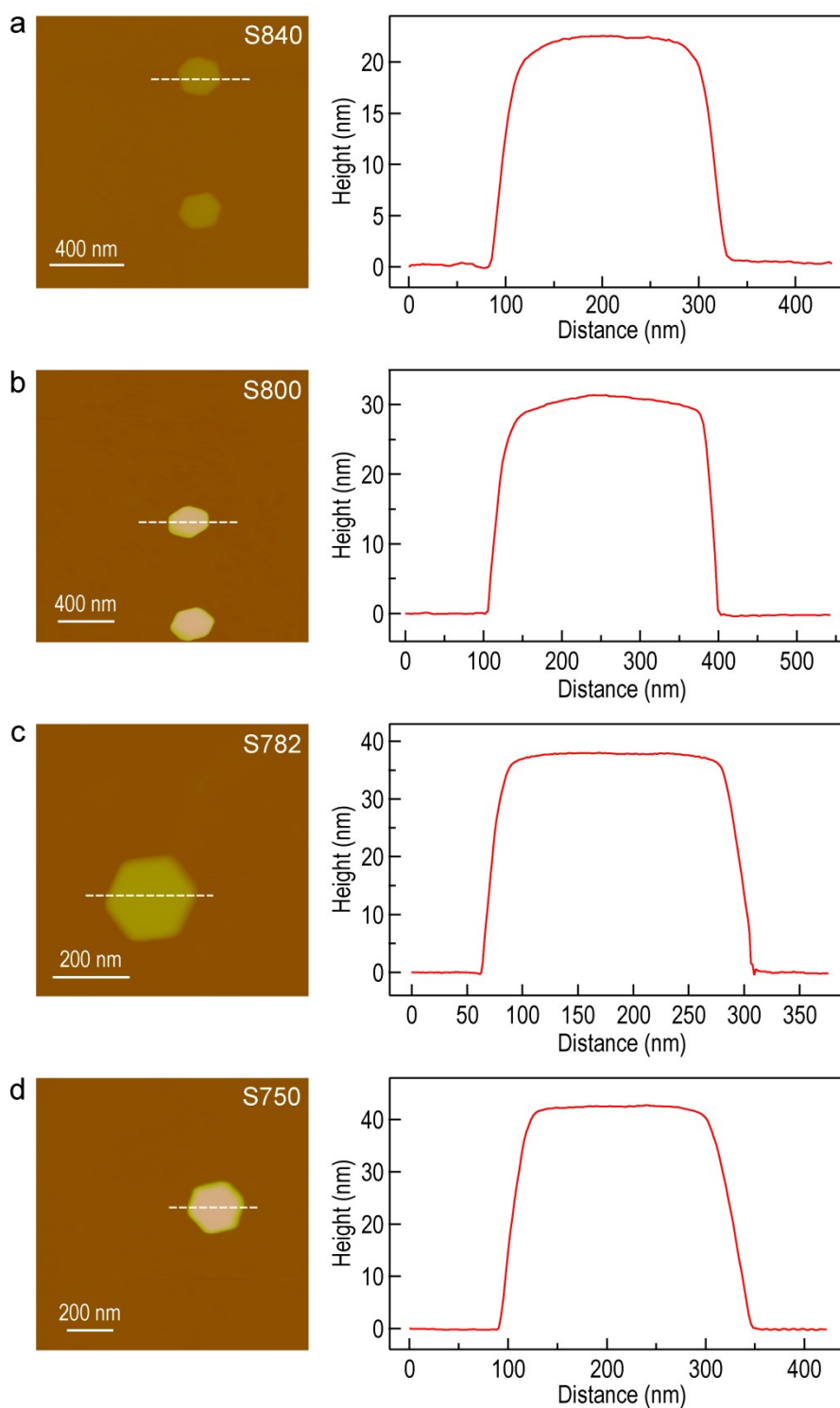
Fig. S1 AFM characterization of the Au NPLs. The AFM images and height profiles of the Au NPLs are shown in the left and right columns, respectively. The height profiles are extracted along the dashed lines indicated in the corresponding AFM images. (a) S840 sample. (b) S800 sample. (c) S782 sample. (d) S750 sample.
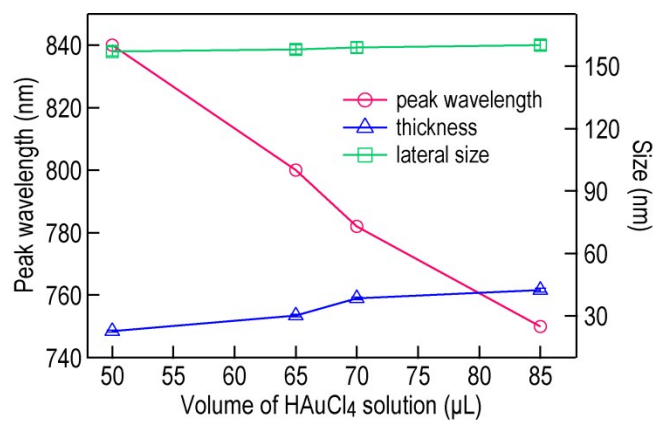
Fig. S2 Sizes and major plasmon peak wavelengths of the Au NPL samples. The major plasmon peak wavelength (left axis), the lateral size and thickness (right axis) are plotted as functions of the volume of the $HAuCl_4$ solution added during the growth of the Au NPL samples. The height of each error bar represents one standard deviation.
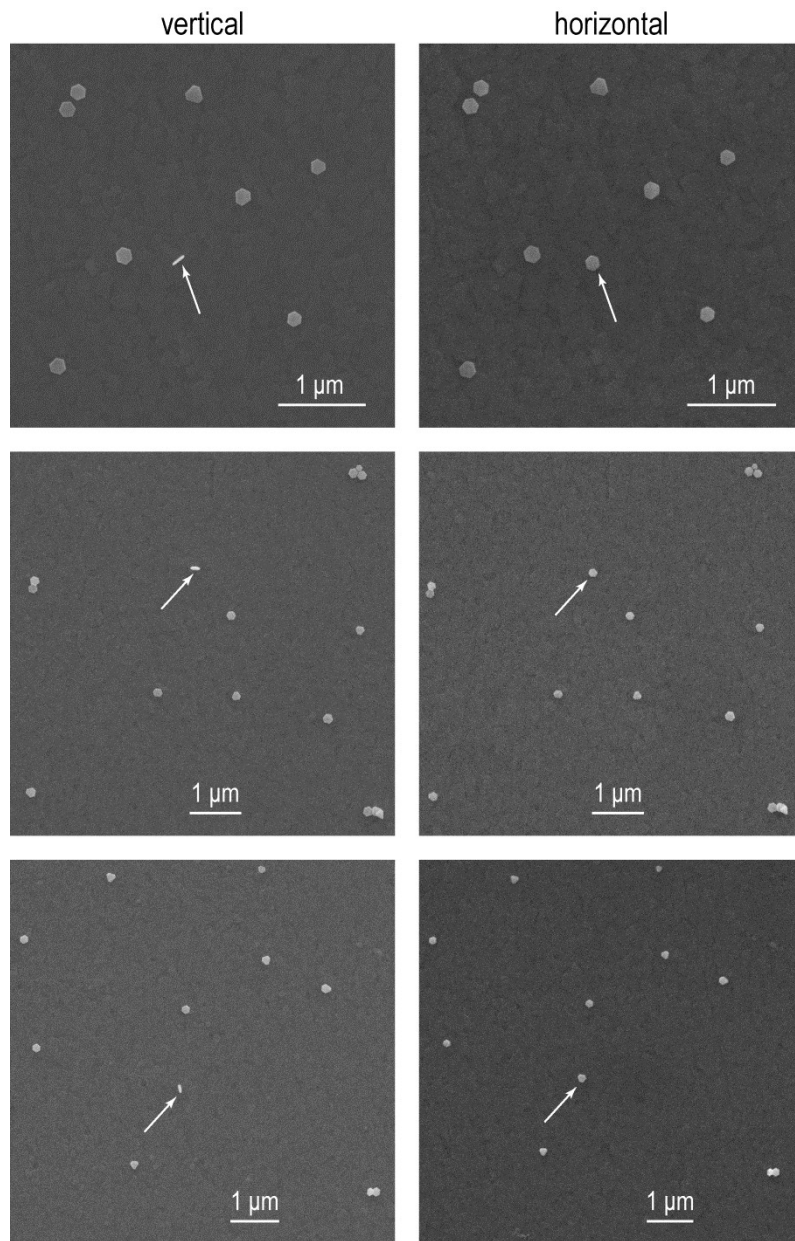
Fig. S3 Knocking-down of the vertical Au NPLs. The SEM images of the Au NPLs before and after being knocked down are shown in the left and right columns, respectively. The targeted Au NPLs are marked by the white arrows. Both of the SEM images in each pair were taken in the same region on the ITO substrates.
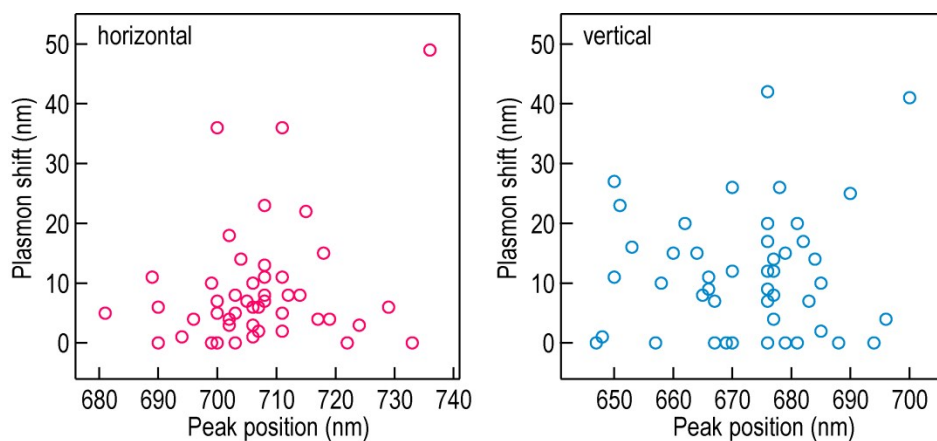
Fig. S4 Plasmon shifts of the S750 Au NPLs upon the binding of HS-PEG. The distributions of the plasmon shifts of the horizontally and vertically oriented Au NPLs are shown in the left and right plots, respectively.

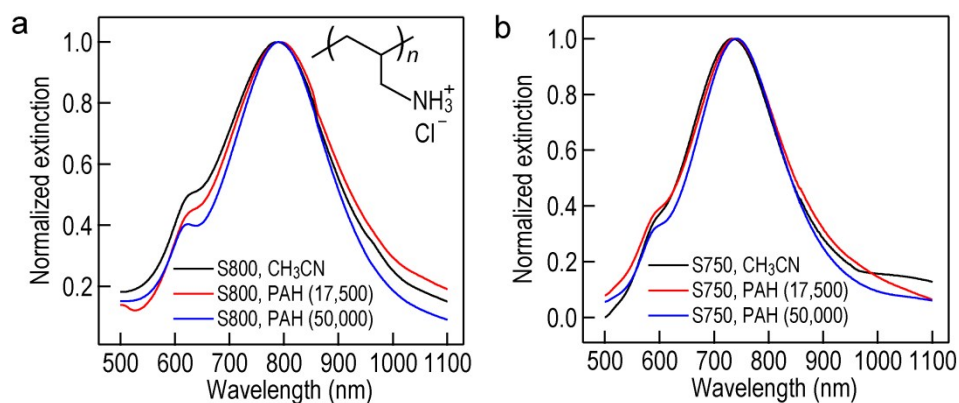**Fig. S5** Extinction spectra of the Au NPLs encapsulated with PAH. (a) Extinction spectra of the S800 Au NPLs that are adsorbed with cyanide ions (black), encapsulated with the small PAH chains (red) and encapsulated with the large PAH chains (blue), respectively. The inset shows the molecular structure of PAH. (b) Extinction spectra measured on the S750 Au NPL samples that were treated similarly.

Table S1 Plasmon peak wavelengths of the S800 Au NPLs before and after the adsorption of PAH with the molecular weight of 17500

S800-PAH (MW: 17500)	Number	Before (nm)	After (nm)	Shift (nm)	Mean shift (nm)
Vertically oriented Au NPLs	1	729	818	89	133 ± 13
	2	752	872	120	
	3	694	848	154	
	4	719	853	134	
	5	697	851	154	
	6	717	851	134	
	7	717	843	140	
	8	715	854	139	
	9	685	820	135	
Horizontally oriented Au NPLs	1	742	812	70	72 ± 21
	2	748	823	75	
	3	708	789	81	
	4	717	748	31	
	5	748	829	81	
	6	760	847	87	
	7	749	809	60	
	8	713	802	89	
	9	725	826	101	
	10	685	734	49	

Table S2 Plasmon peak wavelengths of the S800 Au NPLs before and after the adsorption of PAH with the molecular weight of 50000

S800-PAH (MW: 50000)	Number	Before (nm)	After (nm)	Shift (nm)	Mean shift (nm)
Vertically oriented Au NPLs	1	700	803	103	132 ± 16
	2	731	850	119	
	3	714	874	160	
	4	688	822	134	
	5	677	821	144	
	6	718	859	141	
	7	686	841	155	
	8	679	794	115	
	9	685	823	138	
	10	714	821	107	
Horizontally oriented Au NPLs	1	781	849	68	87 ± 17
	2	780	857	77	
	3	724	815	91	
	4	750	837	87	
	5	695	791	96	
	6	791	850	59	
	7	747	839	92	
	8	797	855	58	

Table S3 Plasmon peak wavelengths of the S750 Au NPLs before and after the adsorption of PAH with the molecular weight of 17500

S750-PAH (MW: 17500)	Number	Before (nm)	After (nm)	Shift (nm)	Mean shift (nm)
Vertically oriented Au NPLs	1	687	764	77	104 ± 20
	2	656	792	136	
	3	644	735	91	
	4	680	784	104	
	5	657	777	120	
	6	672	780	108	
	7	653	742	89	
	8	652	739	87	
	9	665	751	86	
	10	670	793	123	
	11	649	778	129	
Horizontally oriented Au NPLs	1	668	717	49	53 ± 7
	2	689	738	49	
	3	713	763	50	
	4	685	732	47	
	5	695	738	43	
	6	700	767	67	
	7	701	766	65	
	8	712	770	58	
	9	669	721	52	
	10	717	764	47	
	11	703	762	59	

Table S4 Plasmon peak wavelengths of the S750 Au NPLs before and after the adsorption of PAH with the molecular weight of 50000

S750-PAH (MW: 50000)	Number	Before (nm)	After (nm)	Shift (nm)	Mean shift (nm)
Vertically oriented Au NPLs	1	687	761	74	115 ± 32
	2	655	813	158	
	3	659	815	156	
	4	651	769	118	
	5	658	749	91	
	6	678	791	113	
	7	646	740	94	
	8	677	763	86	
	9	687	839	152	
Horizontally oriented Au NPLs	1	685	777	92	81 ± 15
	2	711	814	103	
	3	703	790	87	
	4	675	750	75	
	5	706	807	101	
	6	696	797	101	
	7	707	774	67	
	8	715	804	89	
	9	699	758	59	
	10	708	764	56	
	11	716	784	68	