Colorful InAs Nanowire Arrays: From Strong to Weak Absorption with Geometrical Tuning --- Supporting Information

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Nanowire Growth Details

Samples with prepared Au dot lattices were placed in the CBE unit, and TertiaryButylArsine (TBA) was thermally cracked into As and the growth chamber was maintained at As ambient of 1.5 mbar. At the growth temperature of 425 ^{o}C, 0.15 mbar of TriMethylIndium (TMIn) was introduced to initiate growth of NWs. The growth rate was typically 60 nm/minute.[1] Once the targeted nanowire length was achieved, the TMIn flow to chamber was shut and the samples were allowed to cool to nearly room temperature in As ambient background. The samples with grown nanowires were then removed from the CBE unit.

Effect of Au catalyst on reflectance

It is known that Au particles of similar shape and dimensions as the catalyst particles can support (localized) surface plasmon polariton resonances that can have a strong effect on the scattering of light. However, such effects are usually studied in a system where the Au particles are in a non-absorbing dielectric surrounding. In the present study of InAs NWs, the Au particles reside on top of the semiconducting InAs, and this work considers the wavelength region where the InAs absorbs light. This is expected to strongly limit the possibility for resonant excitation of surface plasmon polaritons. To show that this is indeed the case, we show in Fig. S1 the modeled[2] reflectance of NW arrays with and without hemispherical Au[3] particles. It is clearly seen that the Au particles cause only a minor modification of the reflectance, and no signs of surface plasmon polariton resonances are seen.

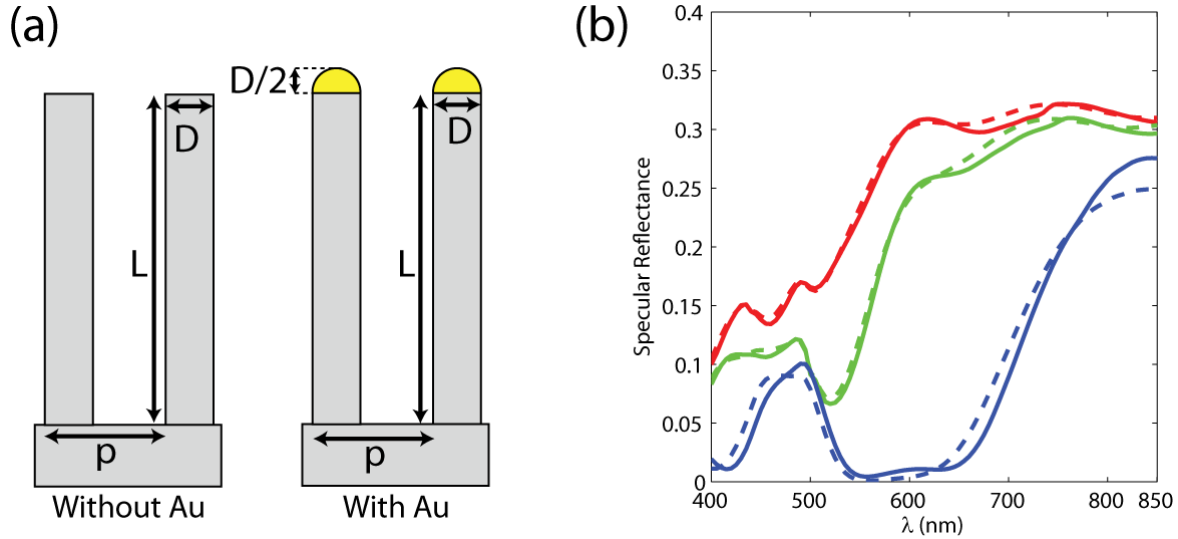

Figure S1. Effect of Au particle on the reflectance of the systems considered in Figure 2 and Figure 3 in the main text. (a) Left: Schematic of modeled InAs NWs with no Au particle at the top. Right: Schematic of modeled InAs NWs with a hemispherical Au particle at the top. (b) Modeled specular reflectance of normally incident light onto an InAs NW array of (red) D = 62.2 nm, p = 435 nm, and L = 1440 nm; (green) D = 73 nm, p= 500 nm, and L = 1408 nm; and (blue) D = 100 nm, p = 320 nm, and L = 690 nm. Solid (dashed) lines are for NWs with (without) a hemispherical Au particle at the top.

D (nm)	P (nm)	L (nm)
39.6	895	5956
45.2	710	4486
47.2	415	2882
50.9	305	1646
50.9	335	1896
56.5	855	3858
56.5	859	3004
56.5	863	4698
56.5	318	1382
56.8	640	3692
62.2	730	3606
62.2	650	2400
62.2	410	1394
62.2	760	2852
62.2	422	1848
62.2	318	1218
62.2	435	1444
62.5	534	1922
62.5	415	1570
64.4	327	1080
67.9	630	2310
68.0	320	1084
68.0	413	1772
68.0	425	1746
71.5	330	1106
73.4	500	1408
73.4	515	1658
73.4	430	1244
73.4	420	1620
73.4	315	892
74.3	438	1634
79.1	614	1960
79.1	430	1332
79.3	330	916
84.8	440	1018
84.8	416	1194
84.8	325	816
90.9	440	1142
90.9	426	1142
90.9	310	842
100.0	320	690
101.7	320	704

Table S1. Nanowire diameter *D*, nanowire length *L*, and array period *P* of the 42 nanowire arrays considered in this study.

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