Supporting Information

Vertically Aligned Gold Nanorod Monolayer on Arbitrary Substrates: Self Assembly and Femtomolar Detection of Food Contaminants

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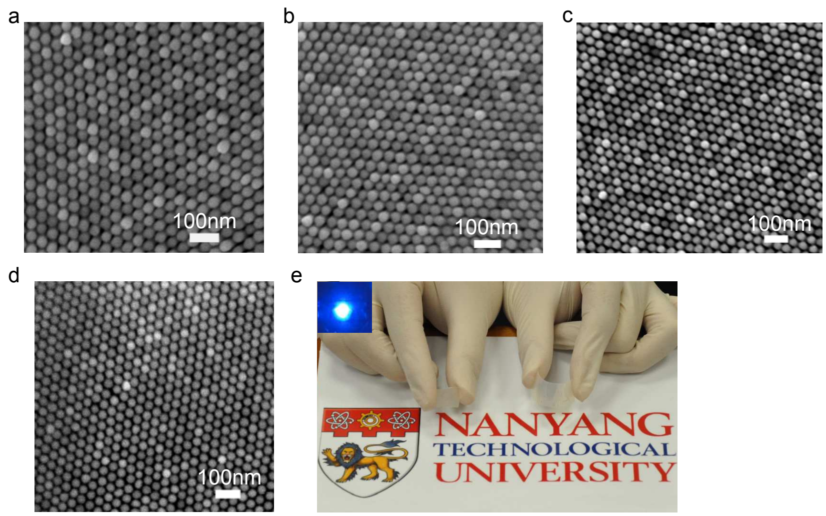
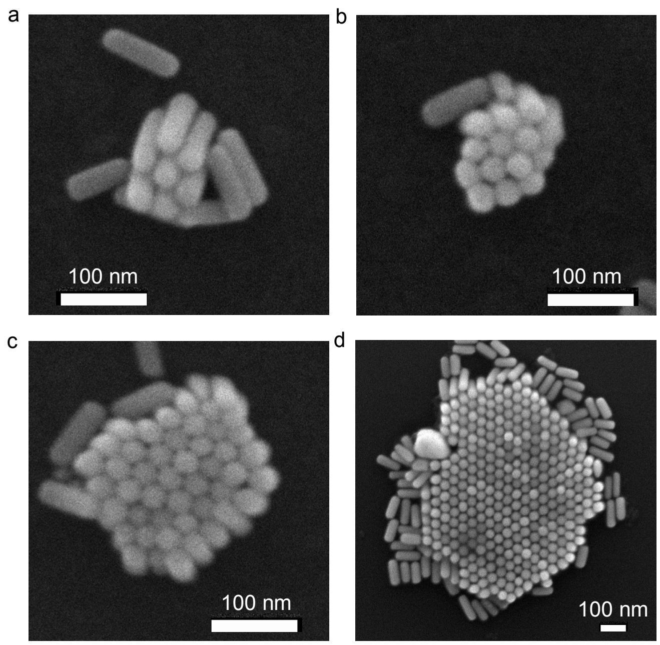


Supplementary Figure S1 SEM images of vertically aligned Au nanorod monolayer on different substrates: (a) GaN LED, (b) ITO glass, (c) glass, (d) flexible PEN polymer films. (e) A picture of our arrays on flexible PEN films and GaN LED device taken with a background of NTU campus magazine to demonstrate the flexibility. The inset is the picture of the GaN LED device at 3.5 mA current.



Supplementary Figure S2 SEM images of the nucleation and growth process of the self-assemblies: (a, b) the hexagonal initial nucleus model drops on the substrate, (c, d) the growing aligned Au nanorod monolayer.

Supplementary S3

Van der Waals potential of two similar parallel rods can be given by[1]

$$E_{Vdw} = -\frac{Alr^{1/2}}{24h^{3/2}} \quad (1)$$

where A is the effective Hamaker constant (~1×10^{-19} J).[2] l is the length of Au rod. r is the radii of Au rod. h is the separation between their surfaces of adjacent Au nanorods. The depletion potential between two parallel Au nanorods can be given by[3]

$$E_{dep} = -\frac{1}{2}lP_0[-h\sqrt{(2r+m)^3 - h^2} + (2r+m)^2 \arccos(\frac{h}{2r+m})] \quad (2)$$

where m is the diameter of CTAB micelles, 5.8 nm.[2] $P_0 = n_{micelles} R_c T$ is the osmotic pressure generated by the micelles, R_c is the universal gas constant. T is the Kelvin degree. $n_{micelles}$ is the concentration of CTAB micelles, $n_{micelles} = (c_{CTAB} - c_{CMC}) / N_{agg}$. N_{agg} is the aggregation number of CTAB micelles (120, 2.5 mM).[4] c_{CTAB} is the concentration of CTAB. c_{CMC} is the critical micelle concentration of CTAB, (0.92 mM).[5]

References and Notes

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