Electronic Supplementary Information for:

Micellar block copolymer templated galvanic displacement for epitaxial nanowire device integration

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Figure 1 includes Auger electron spectra collected at various stages in the Au nanoparticle (NP) deposition process. The reemergence of the Si peak at nearly the same proportion to the carbon peak as in the "Clean Si" sample after immersion in hot toluene and sonication indicates nearly complete removal of carbon from the polymer template.
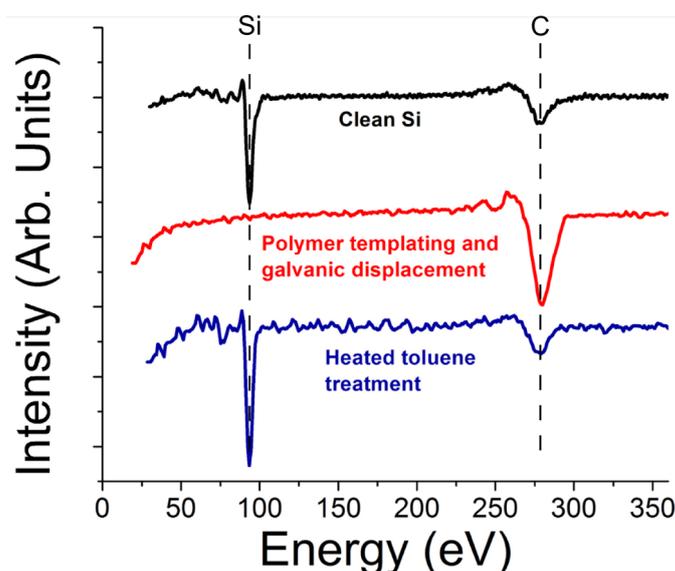
Figure 1 Auger electron spectra collected from samples at various stages in the NP deposition process. The block copolymer template had no added PS and the galvanic displacement was for 10 min. Heated toluene treatment involves temperatures > 70 °C for more than 10 min. followed by sonication for more than 10 min.

Figure 2 shows the cube root of the mean volumes for Au NPs deposited through templates with areal densities > 40 μm^{-2} and < 2 μm^{-2} *versus* immersion time in the Au plating solution. While the same qualitative behavior is observed in both cases, the NP growth rate is subdued for the higher density samples, which may be due to increased competition for $AuCl_4^{-1}$ ions between deposition sites (ie. micelles).

Figure 3 shows SEM images of Au NPs deposited from a micellar template composed of undiluted block copolymer micelles for 1 minute (a) and 10 minutes (b), and from a template with a block copolymer mass fraction of 0.05 relative to the total polymer concentration for 1 minute (d) and 10 minutes (e). The graphs

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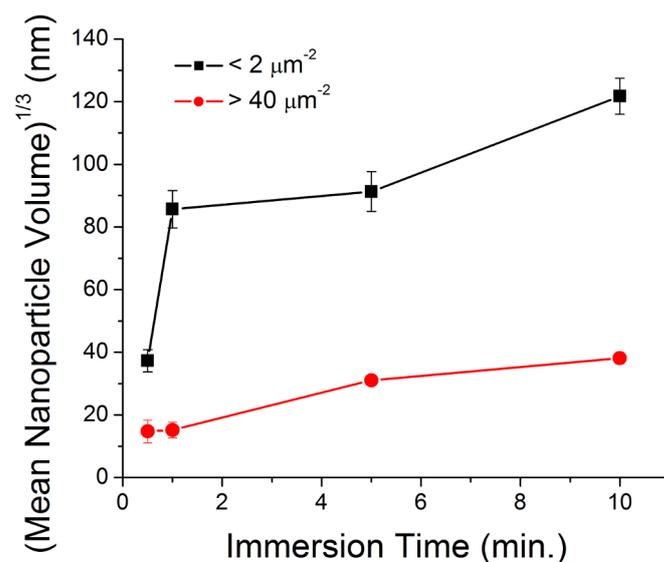
Figure 2 Au NP cube root versus immersion time in the galvanic displacement Au plating solution at micelle surface areal densities of >40 μm^{-2} (red) and <2 μm^{-2} (black). Error bars represent standard deviations.

depicted in Fig. 3(c) and (f) show the areal densities of as-deposited Au NPs (after toluene sonication) as a function of galvanic displacement immersion time for the undiluted block copolymer case (c) and the case with a block copolymer mass fraction of 0.05 (f), indicating no significant changes in the number of Au NPs with increasing immersion time.
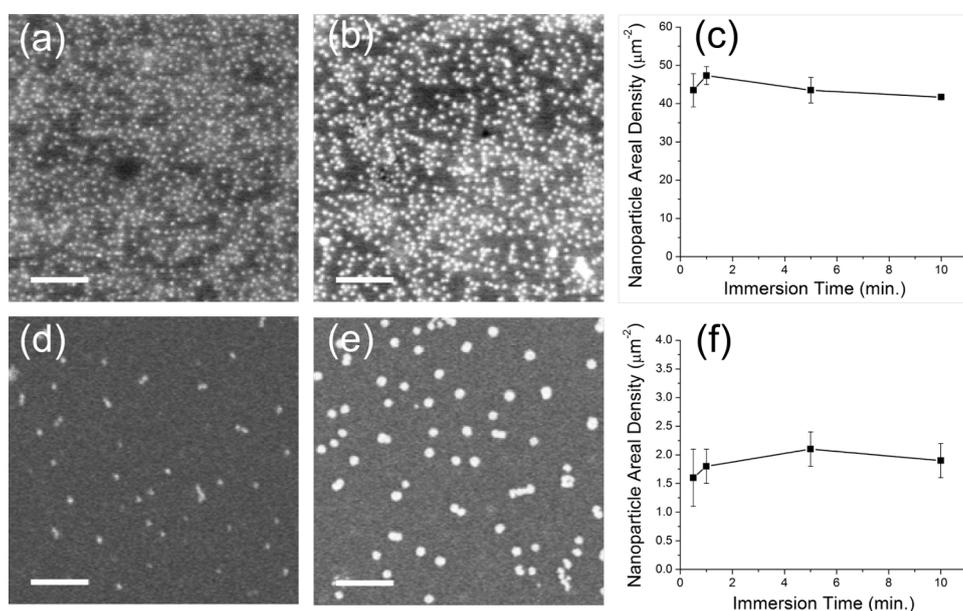
Figure 3 Au NPs deposited from a pure block copolymer micellar template (a-c) and from a template with a block copolymer mass fraction relative to PS homopolymer of 0.05 (d-f), after toluene sonication. (a-b,d-e) SEM images of Au NPs deposited with immersion times of 1 minute (a,d) and 10 minutes (b,e). All scale bars = 1 μm. (c,f) Au NP areal density *versus* immersion time. Error bars represent standard deviations.

Figure 4 shows a X-ray photoelectron spectrum of a clean Si(111) sample. A small bump is visible at a binding energy of ~89-90 eV, which may be attributed to a Si satellite peak from the Al target used in the non-monochromatic X-ray source.
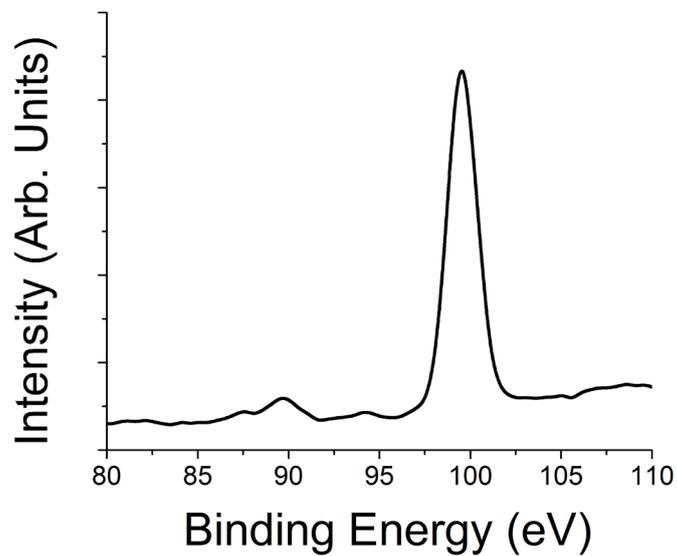
Figure 4 X-Ray photoelectron spectrum of a clean Si(111) sample.