

## Functional metal nanostructures based on block copolymer self-assembly

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We fabricated a high-density array of “accordion-like” plasmonic silver nanorods over a large area ( $\sim\text{cm}^2$ ) exhibiting multiple electromagnetic responses in visible and near-infrared (NIR) wavelengths. This array of “accordion-like” silver nanorods was prepared by confining lamellar-forming polystyrene-block-poly (methyl methacrylate) copolymer (PS-*b*-PMMA) inside cylindrical pores of aluminum oxide (AAO) template grafted by thin neutral brush layers. Due to the multiple resonances exhibited in the visible and NIR regimes, the array could be used for multi-analyte detection. We also fabricated two dimensional metal structures with diverse sized holes by incorporating metal precursor into poly(2-vinyl pyridine)-block-poly(4-vinyl pyridine) copolymer (P2VP-*b*-P4VP) thin film. To control the final structure, we studied the coordination power for metal precursor between P2VP and P4VP as well as the phase behavior of P2VP-*b*-P4VP with various amounts of gold nanoparticles. Although both blocks of P24VP exhibit attractive interaction to gold nanoparticles, we observed the unusual phase behavior as increasing the amount of gold nanoparticles.