

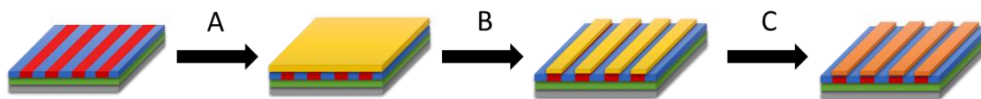
Block copolymer based nanoplasmonic surfaces

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Metal-dielectric nanocomposites are attracting a lot of attention for optical applications, due to their capacity to support designed surface plasmon waves. These nanocomposites are prominent in optical metamaterials, which are artificially structured materials engineered to gain optical properties not only from their composition, but from their design. Their geometry, size and arrangement can affect the propagation of light in an unconventional manner, giving rise to properties which are not available in bulk materials. Metamaterials and nanophotonic devices are classically fabricated by lithography techniques, but alternative simpler techniques are needed to reach characteristic sizes of a few tens of nanometers.



Scheme 1: General diagram of the fabrication process, A) Spin coating of the gold precursor, B) Rinse with water to remove the excess of precursor, C) UV treatment to reduce the salt gold to metallic gold.

In this work we report a new strategy to obtain metal nanoparticles in a matrix of dielectric polymer. Perpendicular lamellar structures of poly(styrene)-*b*-poly(2-vinylpyridine) (PS-P2VP) copolymers were obtained using chemically modified substrates, followed by the metallic precursor deposition, which is selectively incorporated to the P2VP domains. A subsequent UV treatment reduces the gold precursor and allows obtaining a polymer matrix with gold nanoparticles selectively and homogenous distributed in one domain of the block copolymer as show in Figure 1. Atomic Force Microscopy (AFM), Transmission Electron Microscopy (TEM), and X-ray Photoelectron Spectrometry (XPS) have been use to characterize them. Besides, the plasmon resonances of the nanostructures are studied by variable-angle spectroscopic ellipsometric.

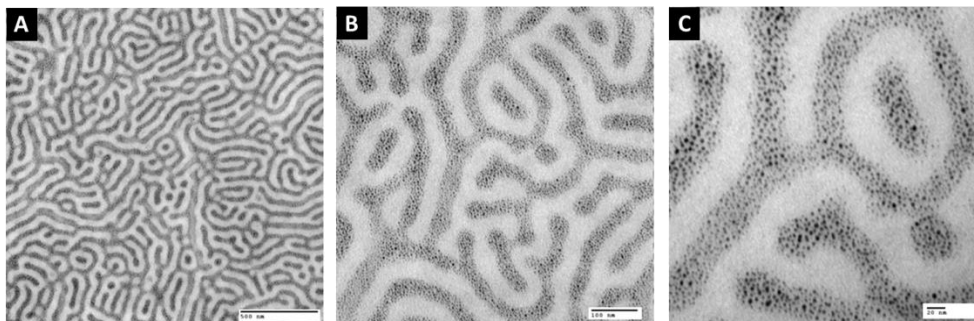


Figure 1: TEM top-view micrographs of PS-*b*-P2VP lamellar films after spin coating of the gold precursor and 5 hours of UV radiation treatment

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