PLASMONICALLY ACTIVE SILVER NANOWIRE STRUCTURES
FOR ENERGY STORAGE APPLICATIONS
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Currently, there are no sustainable solutions available to meet the increasing demand for grid scale energy storage. Solar to fuel conversion has the potential to curb our dependence on natural gas and costly storage technologies by recycling waste products into chemical fuels. A realistic device must be efficient, scalable, and inexpensive, which is a combination not yet achieved. Plasmonic devices could meet these criteria given their long lifetime, scalable processing methods, and potential for efficiency improvements. By combining uniquely structured plasmonic metals with stable metal oxides, hot electrons can be harvested to drive difficult chemical reactions. Silver nanowires were used as light absorbers because of their unique morphology, yielding broader visible light absorption. To form the nanowires, silica–surfactant composite mesostructures were formed inside cylindrical anodic alumina nanopores. The silica mesostructures were then used to synthesize the unique silver nanowires using AC electrodeposition. Scanning electron microscopy and ultraviolet–visible spectroscopy were used to characterize the nanowires. Nanowires with unique structures were made to absorb light in the visible spectrum. With the ability to create silver nanowires in different morphologies, we hope to find that the plasmonic effect is amplified due to increased surface area of the nanowires. This could result in a plasmonic device with increased efficiency, bringing us one step closer to finding a sustainable solution to the increasing demand for grid scale energy storage.