Recent advances in nanofabrication have stimulated research efforts in the field of flexible plasmonics by integrating functional metasurfaces onto mechanically flexible substrates. In this thesis, we report on the fabrication of flexible metasurfaces composed of gold regular and elliptical nanoring arrays embedded in polydimethylsiloxane (PDMS), using state-of-the-art electron beam lithography and wet-etching transfer techniques. In-situ dark-field reflection spectra are monitored on the flexible systems by implementing a homemade micro-stretcher inside the spectroscope. The feasibility of pattern transfer and reliability of optical measurement are further confirmed by subsequent SEM characterizations on PDMS. The spectral behavior of thin-width nanoring square arrays exhibits a significant shift towards longer wavelengths due to in-situ shape changes under strain. The shape-altering ability is carefully demonstrated through optical/SEM measurements and numerical simulations, which is further understood by a purposed squeezing mechanism. On the other hand, the spectral evolution of elliptical nanorings in square and triangular arrays presents interesting polarization dependence and spectral blueshift under strain. The square array subjected to high strain values exhibits also surface lattice resonances with Fano features due to the coupling between the grating and plasmonic modes. Additionally, we demonstrate Fano resonances in ring-disc-pair hybrid systems on a rigid substrate. The ring-disc-pair system shows significantly enhanced Fano features and surface-