

Development of Optical Sensor Utilizing a Single-Crystalline Metal Film on NaCl (001) Substrate

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Summary

A new experimental technique is developed for producing a low-loss single-crystalline metal film on any substrate for use in plasmonics and metamaterials. This technique is based on the epitaxial growth of gold on a (001)-oriented single-crystalline NaCl substrate, which is subsequently dissolved in ultrapure water to allow the film to be transferred onto transparent amorphous substrates. Focused ion beam milling is then used to create an Au nano line and space (L/S) structures consisting of L/S wide from 100 to 300 nm with a side length of 50 μm and sharp, precise edges by using a single-crystalline Au film. This L/S exhibits a strong signal and a sharp peak in plasmonic properties when compared with a polycrystalline Au L/S structures.