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Determining fitness of Au_xAl_{1-x} thin films for use in surface plasmon resonance sensors[1] MOLLY KATE KREIDER, ABDUL QADEER REHAN, ROBERT KENT, MARIAMA REBELLO SOUSA DIAS, University of Richmond — Metals exhibiting well-defined surface plasmon resonance (SPR) responses form the basis for SPR sensing devices that work to analyze a medium by detecting minute changes to its index of refraction. Au works particularly well for such a device due to its highly sensitive and sharp minima in its reflectance spectra. Other materials, such as Al, also exhibit defined SPR responses, though Al is not ideal for application in sensing because of its tendency to oxidize. In this work, we analyze the SPR response for both fixed incident angle and fixed incident wavelength of pure Al, pure Au, and 4 Au-Al bimetallic thin films to determine their capability for application in sensing devices. These films were fabricated using the co-sputtering deposition method and then given a temperature treatment. Specifically, for each film at four different thicknesses, we analyze the sensitivity of the location of the reflectance dip as well as two qualities pertaining to the shape of the graph, the full width at half maximum (FWHM) and the peak height. Performing a full analysis yielded that generally, the alloys outperformed the pure films for fixed incident angles, at the expense of a markedly larger FWHM. However, $Au_{0.85}Al_{0.15}$ was more sensitive than pure Au and Al in every configuration while maintaining a comparable peak height and FWHM and without exhibiting any oxidation, suggesting it may be suitable for application in sensing devices.

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