Surface plasmon resonance (SPR) research has grown substantially over the past several years and led to many substantial discoveries in nanotechnology. SPR is a phenomenon where light can be coupled to the interface between a metal, such as gold or silver, and a dielectric material, such as air or glass, to form an oscillation in the electrons at the interface. While only a few hundred nanometers in size, the electromagnetic field formed by this oscillation can interact with nearby molecules, such as fluorophores. Fluorophores are a specific class of molecules that absorb specific wavelengths or colors of light and emit a longer wavelength color back. If a fluorophore interacts with SPR, the resulting emission of light will be much brighter than normal. One research field, in particular, fluorescence biosensors, could greatly benefit by incorporating SPR as it can increase the sensitivity several orders of magnitude. In this research project, the ridge-groove structures also known as gratings found in HDDVDs and Bluray discs were transferred to microscope slides or silicon wafers and coated in silver to convert them into plasmonic gratings or gratings that can generate SPR if illuminated with light at a specific angle. The plasmonic gratings were found to increase the fluorescence emission intensity by 100-200 times their normal intensity. The plasmonic gratings were then incorporated into a biosensor for the detection of cortisol, an important stress hormone, and found that the plasmonic gratings increased the sensitivity of the biosensor such that normal cortisol levels in saliva could now be detected. The plasmonic grating was also incorporated into a biosensor for the detection of single strand DNA with similar sensitivity enhancements. These plasmonic gratings represent a simple yet effective means of greatly enhancing the fluorescent emission, and ultimately sensitivity, of any fluorescence microscope or biosensor system in which it is incorporated.