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Surface plasmon enhanced Förster resonance energy transfer in fluorescent molecules using metal wire gratings ZACH WETZEL, JENNIFER STEELE, Trinity University — Forster resonance energy transfer (FRET) is a powerful tool used to study spatial relationships in biological systems. FRET relies on a nonradiative energy transfer between a donor (D) and acceptor (A) fluorophore. The D-A pair must be located within their Forster radius for an efficient transfer of energy. Surface plasmon (SP) excitations increase the emission of fluorescent molecules by two mechanisms. SPs excited at the fluorophore absorption wavelength increase the excitation rate of the fluorophores. SP modes at the fluorophore emission wavelength provide an additional decay channel for the fluorophores to return to the ground state, increasing the quantum yield and the photostability of the fluorophore. In this study, metal wire gratings were chosen because gratings support SP resonances over a wide wavelength range, allowing overlap for both absorption and emission wavelengths. This research seeks to develop methods for using metal grating SPs to increase the Forster radius for D-A pairs. For this project, gold gratings with a period of 500 nm were fabricated using a nanotransfer printing method. Fluorescence was measured as a function of angle to determine the enhancement. These outcomes will increase the number of physical systems that can utilize FRET.

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