ROTATIONALLY-RESOLVED IR SPECTRUM OF A COLLISION COMPLEX: THE 02^20-00^00 BAND OF CO_2 COLLIDING WITH A SELF ASSEMBLED MONOLAYER

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Metallic arrays with subwavelength apertures have been developed that exhibit resonant transmissions across the infrared range. These meshes transmit more light than is incident upon their holes due to the excitation of surface plasmons (SPs) that propagate along the metallic surface. The SPs may tunnel through a hole, reemerging as photons on the other side of the mesh, without being scattered from the incident beam. This arrangement offers a long effective pathlength for absorption by molecules on the surface simply by placing the mesh in the beam of an FTIR spectrometer. In the course of studying the enhanced absorption spectra of alkanethiolate self-assembled monolayers, we discovered a rotationally-resolved ($\Delta J = 0,\pm 2$), collision induced spectrum of CO_2 with the surface, even though there are no allowed bands for absorption by CO_2(g) in this region. The configuration creates a high intensity of light at the surface (in the form of SPs) which is apparently able to sample collisions with the background gas. The geometry of CO_2 in the collision complex will be presented.