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Radiative Polaritons in Thin Oxide Films with Experimental and Simulated Dispersion Relations ANITA VINCENT-JOHNSON, Dept. of Physics, James Madison University, JAMES HAMMONDS JR., Dept. of Mechanical Engineering, Howard University, GIOVANNA SCAREL, Dept. of Physics, James Madison University — Our research focuses on polaritons, or infrared (IR) photon-phonon coupling in ionic materials, as a way to capture IR radiation from the solar spectrum. Radiative polaritons (RP) have the unique property that their phase velocity is faster than the speed of light. We wish to prove that the polaritons present in thin oxide films are RP's with the traits predicted by theory. Therefore, in this work we study simulated and experimental IR spectra of Al_2O_3 films grown by atomic layer deposition (ALD) on Al. Since RP's are characterized by a complex frequency, ω, we have derived from IR spectra the real part, Re(ω), as the peak centroid, and the imaginary part, Im(ω), as the peak's width. Dispersion relations were obtained by plotting Re(ω) and Im(ω) versus the angle of incidence of the polarized IR radiation. The agreement between simulated and experimental data and between our data and theory allow us to conclude that RP's are present in thin oxide films.

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