Dielectric-coated silicon materials are essential building blocks in integrated circuits that are used in ultra-large-scale integrated circuits. Before these materials can be put into ultra-large-scale circuits, they have to go through plasma processing. During plasma processing the dielectric material is often damaged because the plasma is a harsh environment filled with high-energy radicals, electrons, and ions as well as energetic photons. Using vacuum ultra-violet (VUV) radiation, the damaged caused by plasma processing has the potential to be reduced significantly. Complex permittivity can be found by using the reflectance of a material at varying energy levels. Once permittivity is found, using Kramers-Kronig calculations, the refractive index (n) and the extinction coefficient (k) can both be obtained. The refractive index is a measure of how much the speed of light changes when it enters a certain medium. The extinction coefficient refers to the amount of energy loss when a wave enters a material. Using these two we will be able to determine the properties of various dielectric materials that can be used in microelectronic fabrication.