

Optical Properties and Excitons of Alpha Quartz

We present an *ab initio* study of the optical absorption spectrum of alpha-quartz. The theoretical absorption spectrum is calculated by solving the Bethe-Salpeter equation for the interacting electron-hole system and found to be in excellent agreement with the measured spectrum up to 10 eV above the absorption threshold. We find that excitonic effects are crucial in understanding the sharp features in the absorption spectrum in this energy range. They are also crucial in the *ab initio* computation of the static dielectric constant.