Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Lyddane-Sachs-Teller Analysis of Electronic Transitions[1] WILLIAM KARSTENS, Saint Michaels College, DAVID Y. SMITH, University of Vermont and Argonne National Laboratory — We have explored the use of the Lyddane-Sachs-Teller (LST) relation for analysis of electronic optical spectra. This relation originated in the theory of IR lattice absorption and, in analogy with the high IR reflectivity of polar crystals, we demonstrate a substantial region of almost-metallic UV reflectivity above the fundamental electronic absorption in selected solids; it is especially pronounced in group IV elements. This electronic *Reststrahlen* is terminated by a well-defined longitudinal plasmon and may be understood within LST theory. The original LST formulation neglects dissipation; we show it reflects the geometric symmetry of a normalized dispersion curve based on relative frequencies and polarizabilities. If dissipation is included, absorption widths enter only in second order, so the original LST relation applies to optical spectra that can be approximated by the Lorentz model. The Kramers-Kronig based moments formulation of Noh and Sievers [1] holds generally. The normalized curve is specified by a single strength parameter that may be used as an approximate index to characterize optical response. The dielectric response of covalent semiconductors will be discussed as examples of the LST relation and the dependence of energy-loss spectra on electronic properties. [1] T. W. Noh and A. J. Sievers, Phys. Rev. Lett. **63**, 1800 (1989).

[1]Supported in part by the US Department of Energy, Office of Science, Office of Nuclear Physics under contract DE-AC02-06CH11357

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Date submitted: 14 Nov 2014 Electronic form version 1.4