

Raman scattering near the structural phase transition of As_2O_5 : order parameter treatment

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The structural phase transition of As_2O_5 at $T_c = 578$ K is associated with frequency shifts of the strongest Raman lines at 35.5, 66.2, 567.7 and 579 cm^{-1} according to $\sim [(T - T_c) / T_c]^{0.5}$. Although the temperature evolution of the line profiles is grossly in agreement with a displacive transition mechanism, the saturation of the lowest phonon branch at 27 cm^{-1} and the spontaneous increase of the linewidth at T_c by 1.2 cm^{-1} indicate the influence of relaxational or order-disorder processes. The temperature dependence of the order parameter related to the sublattice deformation follows mean-field theory within experimental resolution. The possible influence of order parameter coupling on the structural phase transition is discussed.