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Application of the Anisotropic Bond Model to a Single Bond Attached to a Sphere E.J. ADLES, D.E. ASPNES, North Carolina State University — The configuration consisting of a single adatom on a sphere of dimensions small compared to the relevant wavelength of light is of interest to both surface-enhanced Raman scattering (SERS) and second-harmonic generation (SHG). Here we apply our recently developed anisotropic bond model (ABM) of nonlinear optics (NLO) to investigate this configuration. The ABM provides a simple means for calculating NLO properties by factoring the problem into the fundamental 4-step process of optics: first, determine the local field at the bond charge site; second, solve the anharmonic force equation for the bond charge; third, calculate the radiation from the accelerated bond charge; fourth, superpose the radiation from all charges. This factorization is possible because typical NLO signals occur at different energies with intensities that are orders of magnitude weaker than the driving fields. Therefore, NLO problems are actually simpler than linear-optics problems where all four steps must be solved self-consistently. For SERS, the calculations show that the strength of the exciting field is enhanced via the "lightning-rod" effect, but no such enhancement occurs for the emerging radiation.

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