interest in the data. Typically, transfer functions are implemented by *texture lookup tables*, though simple functions can also be computed in the fragment shader. For example, Figure 39-2 illustrates the use of a transfer function to extract material boundaries from a CT scan of a tooth.

Images are created by sampling the volume along all viewing rays and accumulating the resulting optical properties, as shown in Figure 39-3. For the emission-absorption model, the accumulated color and opacity are computed according to Equation 1, where C_i and A_i are the color and opacity assigned by the transfer function to the data value at sample *i*.

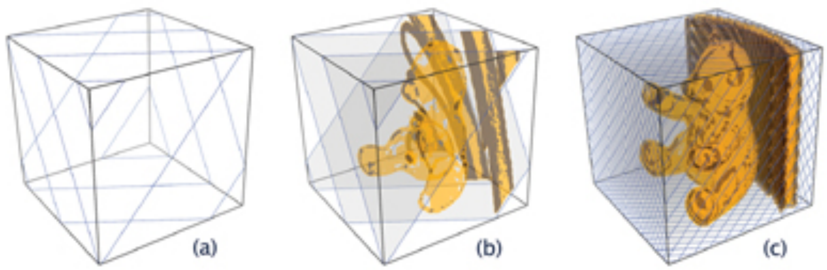

Figure 39-3 Volume Sampling and Compositing

Equation 1 Discrete Volume Rendering Equations

$$C = \sum_{i=1}^{n} C_i \prod_{j=1}^{i-1} \left(1 - A_j\right)$$

$$A = 1 - \prod_{j=1}^{n} \left(1 - A_j\right)$$

Opacity A_i approximates the absorption, and opacity-weighted color C_i approximates the emission and the absorption along the ray segment between samples *i* and *i*+ 1. For the color component, the product in the sum represents the amount by which the light emitted at sample *i* is attenuated before reaching the eye. This formula is efficiently evaluated by sorting the samples along the viewing ray and computing the accumulated color *C* and opacity *A* iteratively. Section 39.4 describes how the *compositing* step can be performed via alpha blending. Because Equation 1 is a numerical approximation to the continuous optical model, the *sampling rate s*, which is inversely proportional to the distance between the samples *l*, greatly influences the accuracy of approximation and the quality of rendering.