38.11. Solve: **(a)** A metal can be identified by its work function. From Equation 38.8, the stopping potential is

$$V_{\text{stop}} = \frac{hf - E_0}{e} \Rightarrow E_0 = hf - eV_{\text{stop}}$$

The frequency and energy of the photons are

$$f = \frac{c}{\lambda} = \frac{3.00 \times 10^8 \text{ m/s}}{200 \times 10^{-9} \text{ m}} = 1.500 \times 10^{15} \text{ Hz} \Rightarrow hf = \left(4.14 \times 10^{-15} \text{ eV s}\right)\left(1.500 \times 10^{15} \text{ Hz}\right) = 6.21 \text{ eV}$$

If the stopping potential is $V_{\text{stop}} = 1.93$ V, then $eV_{\text{stop}} = 1.93$ eV. Thus,

$$E_0 = hf - eV_{\text{stop}} = 6.21 \text{ eV} - 1.93 \text{ eV} = 4.28 \text{ eV}$$

Using Table 38.1, we can identify the metal as *aluminum*.
(b) The kinetic energy of the electrons and thus the stopping potential are *independent* of the light intensity. A more intense light generates more electrons, but the electrons still have the same kinetic energy. The stopping potential is $V_{\text{stop}} = 1.93$ V after the intensity is doubled.