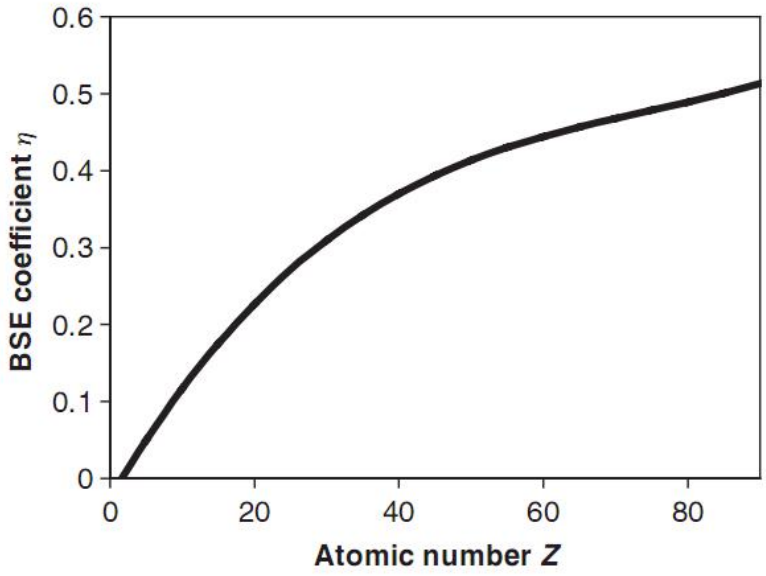
Atomic number dependence of BSE

For a given angle of incident beam, the BSE coefficient is found to increase smoothly and monotonically with atomic number Z.

This dependence on Z (Z contrast or atomic number contrast) provides an important contrast mechanism in SEM, enabling different materials to be distinguished. The curve of η as a function of Z can be fitted with an expression of,

$$\eta = -0.0254 + 0.016Z - 1.86 \times 10^{-4}Z^2 + 8.3 \times 10^{-7}Z^3$$



Backscattered electron coefficient η as a function of atomic number Z

Atomic number contrast (Z contrast or compositional contrast), resulted from the difference in emission of backscattered electrons, and the contrast produced due to regions with different atomic numbers, i.e. the regions with high average atomic number will appear bright relative to regions with low atomic number (need a flat polished surface).

For a solid solution, BSE coefficient η follows a simple rule of mixtures of,

$$\bar{\eta} = \sum_i C_i \, \eta_i \qquad \text{and} \qquad \bar{Z} = \sum_i C_i Z_i$$