Tilting angle dependence of BSE

The BSE coefficient is found to vary with the tilt angle of the sample, and the reason for this originates from the geometry of the escape depth relative to the incident primary beam.

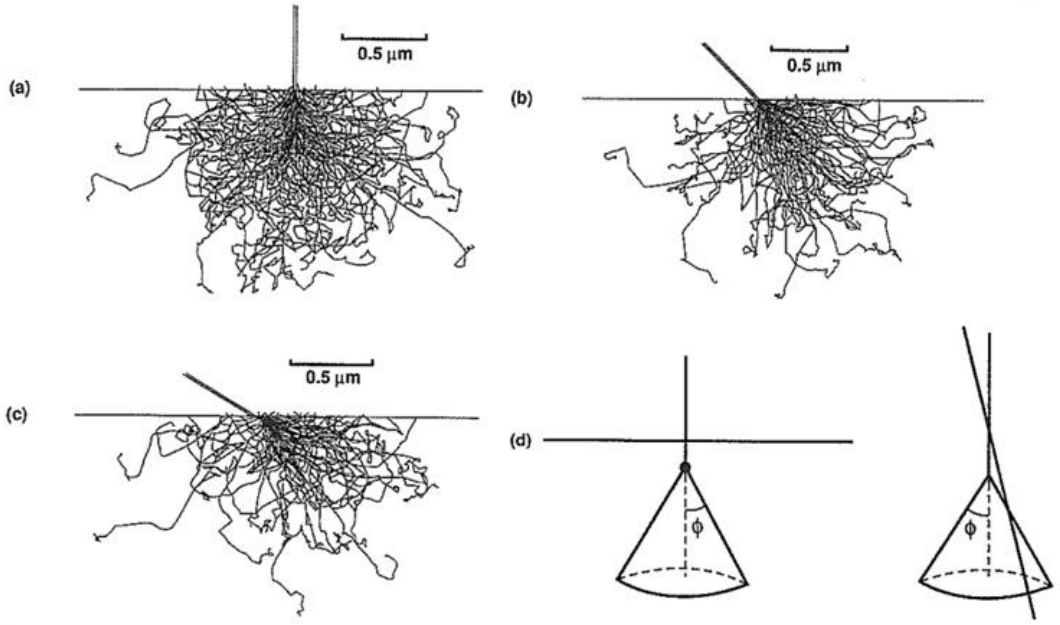
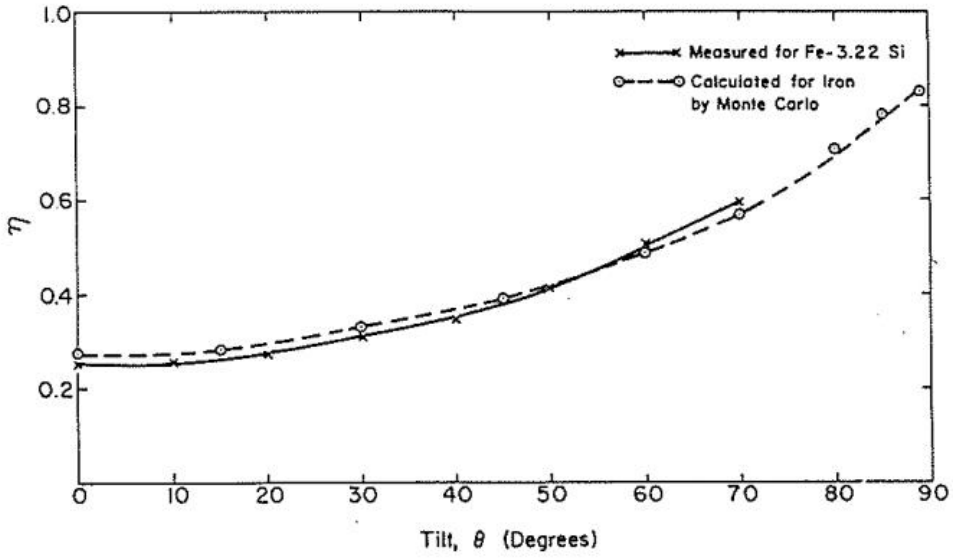


Figure 3.6. Monte Carlo electron trajectory simulations of the interaction volume in iron at $E_0 = 20\,\text{keV}$ for various tilts: (a) 0° tilt, (b) 45° tilt, (c) 60° tilt. (d) Schematic illustration of the origin of increased backscattering from tilted specimens. Consider a given average elastic scattering angle ϕ which produces the scattering cone indicated. The electron may land at any point on the base of the cone with equal probability. At normal incidence, no matter where on the base of the cone the electron lands, it tends to continue propagating into the solid. When the specimen is tilted, some of the possible locations on the base of the scattering cone actually carry the electron out of the solid immediately.

This behavior can also serve as an important contrast mechanism, i.e. different topographical features are possible to be distinguished on the basis of variations in η.



BSE coefficient η as function of the titling angle for FeSi alloy, showing that η increases slowly up about to 20° but increases quickly above about to 30°.