Rate of cooling of magmas and the texture of igneous rocks

Slow cooling:

- Longer cooling time allows longer random walks of atoms to sites on crystals.
- Size of crystals:
  - coarse-grained
    - phaneritic
      - From the Greek word φανερός for “visible”
  - phaneritic
    - intrusive
      - plutonic
        - From Pluto, the god of the underworld
  - aphanitic
    - extrusive
      - volcanic
        - From Vulcan, the god of the forge

Fast cooling:

- Shorter cooling time only allows shorter random walks of atoms to sites on crystals.
- Another way to look at this is the much greater surface area of smaller crystals provides more surface area and thus more sites for atoms to join in a shorter time.

*The explanations above assume that many small crystals will exist with fast cooling. Nucleation of many small crystals happens as fast cooling induces a high saturation state that allows crystal nuclei to grow despite their large ratio of surface area to volume, which otherwise thermodynamically disfavors their survival.