Surface features on a growing or dissolving crystal

The sketch at right illustrates some of the features on a growing or dissolving crystal. The key point is that not all atoms at the crystal's surface are equally bonded to that surface (see table below), and not all exposed surface provides equal bonding opportunities for ions that might precipitate onto the crystal. Terraces are comparatively inert and kinks are likely sites of dissolution or preciptiation.

Surface nucleus

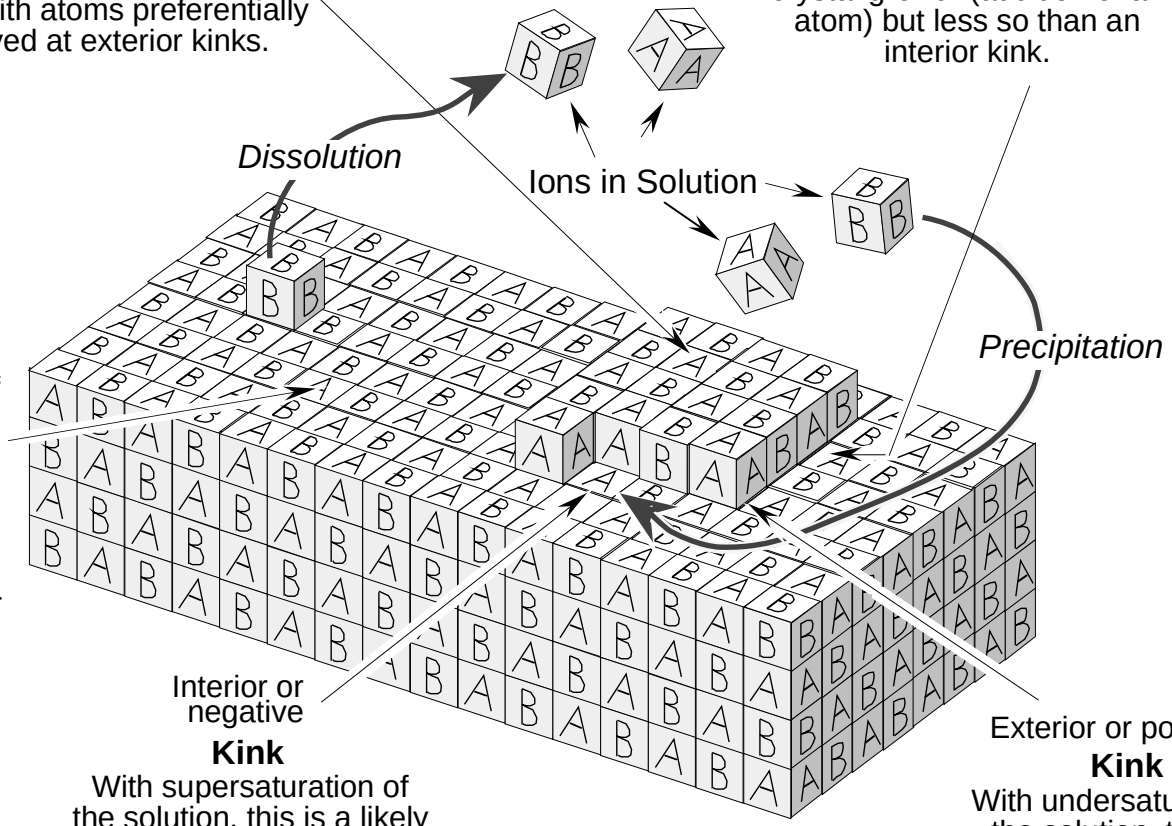
This partial layer will, in a supersaturated solution, grow to build a new terrace, with atoms added prefrentially at interior kinks. In an unsaturated solution, it will be removed to expose the terrace below, with atoms preferentially removed at exterior kinks.

Step

Atoms in a step are bonded to four neighboring counterions and so more likely to leave and dissolve than those in a terrace, but less so than those at an exterior kink. A step is similarly a possible place for crystal growth (addition of an atom) but less so than an interior kink.

Terrace

This is an unlikely area for precipitation (any newly precipitated atom is only bonded to one neighbor counterion) or dissolution (every atom in the surface of the terrace is bonded to five neighbor counterions). A complete terrace is thus a stable surface and a barrier to further precipitation or dissolution.



Kink

With supersaturation of the solution, this is a likely site for precipitation because a newly precipitated atom will be bonded to three neighbor counterions.

Kink

With undersaturation of the solution, this is a likely site for dissolution because the atom is bonded to only three neighbor counterions.

Location	*Bonding counterion neighbors*
Atom in terrace	5
Atom in step	4
Atom at exterior kink	3
Lone atom at step	2
Lone atom on terrace	1