

Morphological instability during electrochemical deposition

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It is well known that morphological instability can be occurred during electrochemical deposition. In many practical processes, e.g., electrochemical deposition or chemical vapor deposition for smooth surface, it is important to suppress a surface roughness. During electrochemical deposition under diffusion dominated ion transport the orientation of electrode is able to affect a surface roughness. In other words, natural convection driven by ion concentration gradient can control the critical condition to happen morphological instability.

In the present study, we extended the previous results of buoyancy effect for directional solidification (Young and Davis, 1986). In addition the new critical condition including effect of natural convection for morphological instability during electrochemical deposition is suggested.

Young and Davis, Directional solidification with buoyancy in systems with small segregation coefficient, Physical Review B, 34, 3388–3396 (1986).